AN. 26
1961

86TH ANNUAL REPORT AND FORECAST

ENGINEERING NEWS-RECORD

'61 Task: Volume with Profit

• **There's no recession in construction.** The industry enjoyed a record volume in 1960; and it's heading into '61 with enough momentum to aid the rest of the economy.

• **Additional stimulants from Washington would simply gild the gold.** But if faster production of the products of public construction spending is deemed necessary as a business booster, the construction industry is amply equipped to do the job.

• **It is, in fact, the urgent and continuing need for these end products that guarantees construction's vigor.**

• **The industry's real problem is profits.** Record volume means nothing to a firm operating in the red. Pointing the way to prosperity in the big year ahead are trends in the business and techniques of construction spotted in this 86th annual ENR survey.

Report and Forecast starts on p. 43; Contents p. 21

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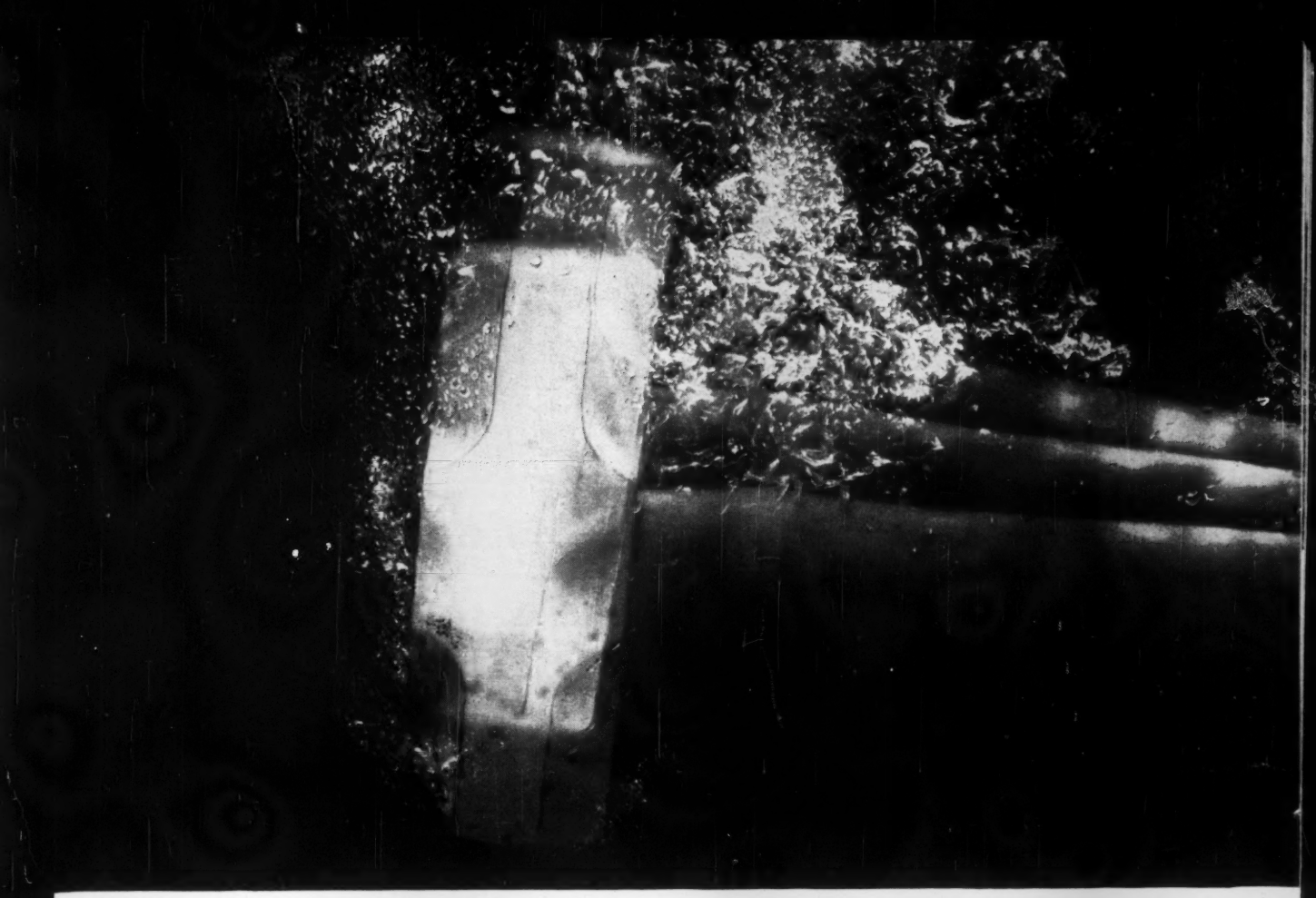

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	1/4 in.			5/16 in.			3/8 in.			7/16 in.			1/2 in.		
TYPICAL ID	WT LB/FT	MAX WRK PRESS PSI	MIN BURST PRESS PSI	WT LB/FT	MAX WRK PRESS PSI	MIN BURST PRESS PSI	WT LB/FT	MAX WRK PRESS PSI	MIN BURST PRESS PSI	WT LB/FT	MAX WRK PRESS PSI	MIN BURST PRESS PSI	WT LB/FT	MAX WRK PRESS PSI	MIN BURST PRESS PSI
24	69	335	1040	86	420	1300	102	505	1560	119	585	1820	136	665	2080
30	86	270	835	108	340	1040	129	405	1250	150	475	1455	170	535	1670
36	106	225	695	130	280	870	155	340	1040	181	395	1210	206	445	1390
42	119	195	595	148	240	745	177	285	890	206	335	1040	234	380	1190
48	137	170	520	171	210	650	203	250	780	236	290	910	268	330	1040
60				214	170	525	255	200	625	296	235	730	336	265	835
72	NOTE: Higher strength steels are available which permit the use of higher working pressures.						309	170	520	359	195	605	408	220	695
96										470	145	455	539	165	520

NOTE:
Based on use of ASTM A-283, Grade B Steel, 50,000 psi min. ultimate tensile strength.

$$P = \frac{t \times Ts}{r}$$

P = internal pressure, psi
t = thickness, in.
Ts = allowable unit stress = 60% x 27,000 (yield point) = 16,000 psi
r = radius of pipe, in.

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ENGINEERING NEWS-RECORD, Vol. 166, No. 4, January 26, 1961

Published weekly by McGraw-Hill Publishing Company, James H. McGraw (1860-1948), Founder. Printed at Albany 1, N. Y. See panel below for directions regarding subscriptions or change in address. Executive, Editorial, Advertising and Circulation Offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y. OFFICERS OF THE PUBLICATIONS DIVISION: Nelson L. Bond, President; Shelton Fisher, Wallace F. Traendly, Senior Vice Presidents; John R. Callaham, Vice President and Editorial Director; Joseph H. Allen, Vice President and Director of Advertising Sales; A. R. Venezian, Vice President and Circulation Coordinator. OFFICERS OF THE CORPORATION: Donald C. McGraw, President; Joseph A. Gerardi, Hugh J. Kelly, Harry L. Waddell, Executive Vice Presidents; L. Keith Goodrich, Vice President and Treasurer; John J. Cooke, Secretary. Subscriptions are solicited only from persons with identifiable commercial or professional interests in construction and building. Position and company connection must be indicated on subscription orders. Publisher reserves the right to refuse unqualified subscription. United States subscription rate for individuals in the field of this publication $6.00 per year, single copies 50 cents; foreign $20 per year, payable in advance. Second-Class mail postage paid at Albany, N. Y. Printed in U.S.A. Title registered in U.S. patent office. ©Copyright 1961 by McGraw-Hill Publishing Co., Inc. All Rights Reserved.

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ENR 61

Reader Comment

Up to the Task?

SIR—We have read with interest the editorial entitled "Up to the Task?" (ENR Nov. 10, p. 116), which apparently implies that the Grant County PUD might not be equal to the job of operating the Priest Rapids Project, which includes both Priest Rapids and Wanapum dams. The editorial also says that ". . . state and federal legislative bodies might well review the laws regulating such once small but now very large local utilities."

We do not concur in the inference left in the reader's mind by this editorial. Let's look at the record. The Grant County PUD admits that it was a very small utility at the time the Priest Rapids Project was first casually mentioned in 1950. It required almost six years from the time the project was first mentioned until the contract was let and actual construction started on Priest Rapids Dam, which we believe is somewhat of a record for the time elapsing between inception and actuality. During the intervening period of less than six years the PUD managed to get the dam deactivated from the jurisdiction of the Army Engineers (the Army was very cooperative), had a feasibility study made, obtained the FPC license, got the plans drawn, floated a $166-million power revenue bond issue, signed a contract for the sale of Priest Rapids power to 12 other private and public utilities, let the contract, and started actual construction on July 9, 1956.

It required another three years to draw the plans for Wanapum Dam, sign another power sales contract with nine electric utilities, float a $195-million revenue bond issue, and start actual construction of Wanapum Dam on July 16, 1959. The combined capacity of Priest Rapids and Wanapum dams will be approximately 1.6 million kw.

As to supervision of the construction of the two dams we might say: The PUD accounts are audited by the state the same as cities, school districts and other municipal bodies. In addition, Price, Waterhouse also conducts an independent annual audit of the books. The Harza Engineering Co. works with PUD engineers in seeing that the dams

(Reader Comment continues p. 9)

Engineering News-Record welcomes expression of opinions from its readers. Comment should be as brief as possible and pertinent to subjects of current construction importance. Letters should be addressed Editor, Engineering News-Record, 330 W. 42nd St., New York 36, N. Y.

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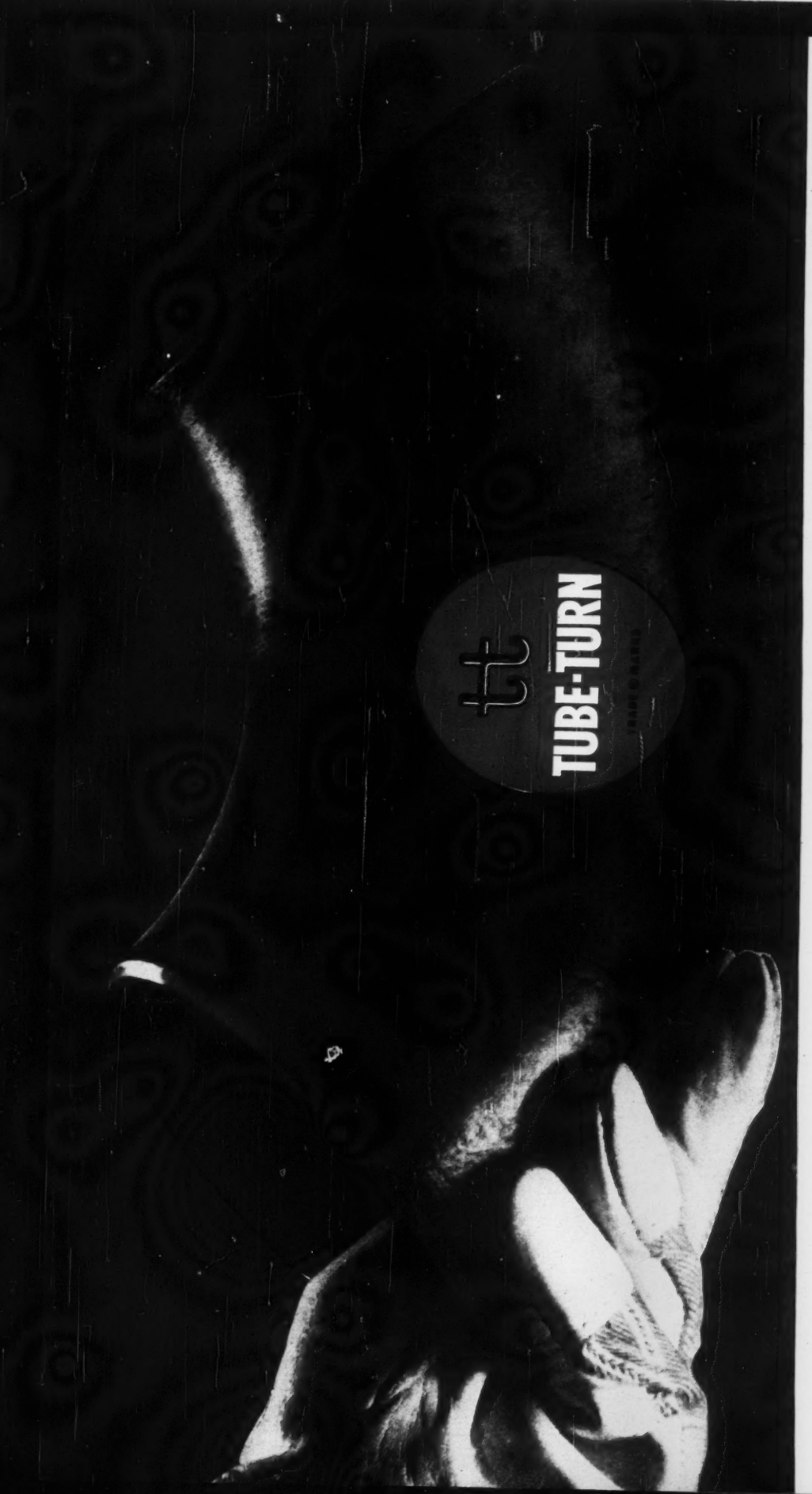

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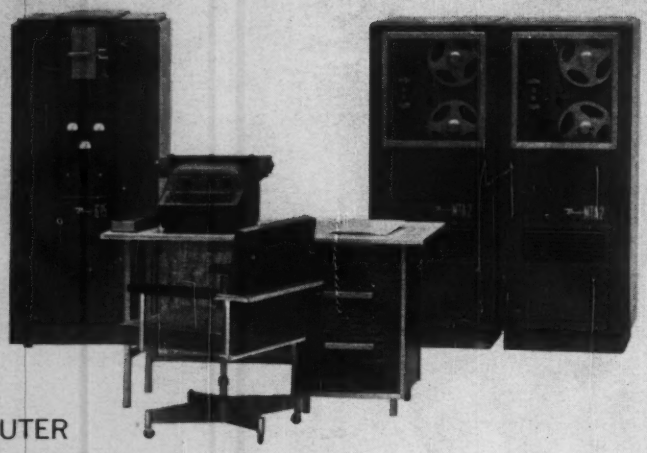

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(For values of R F & L as specified. For values of E ranging from 100 to 300 in increments of 50. For values of C ranging from .00002 to .000021 in increments of .0000001)

COMPLETE ALGO PROGRAM:

```
BEGIN Ⓢ
R = 10 Ⓢ
F = 60 Ⓢ
L = ₀2 Ⓢ
FOR E = 100(50)300 BEGIN Ⓢ
FOR C = ₀00002(₀0000001)₀000021 BEGIN Ⓢ
I = E/SQRT(R ↑ 2 + (6₀2832 * F * L — (1/(6₀2832 * F * C))) ↑ 2) Ⓢ
PRINT (FL)   E Ⓢ
PRINT (FL)   C Ⓢ
PRINT (FL)   I Ⓢ
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are built according to specifications. H. Zinder & Associates made the feasibility report on the Priest Rapids Project and have been retained as consultants by the Grant County PUD. The power purchasers have an advisory board of engineers, which periodically visits the projects and makes recommendations. A consulting board of five nationally known engineers periodically examines the work that is being done.

To operate the two dams and schedule the power the PUD has obtained a staff of top men of from 10 to 30 years' experience with some of the largest hydroelectric projects in the U.S.

Let's go back to the power sales contract for a minute. It was drawn up with the help of the nationally known firm of Wood, King and Dawson of New York City, plus assistance from our own attorneys plus help from the legal staffs of the 12 power purchasers. Since this contract required several months of work, revision of 37 drafts, and much study by all parties involved, we doubt if it could be classified as a hastily written document.

Let's look at the operating record of the electric distribution system. The Grant County PUD maintains more than 1,700 miles of pole line serving 14,000 customers in an area larger than the state of Rhode Island. Despite this widespread marketing area, the 1959 rate to residential customers was only 9.02 mills per kwh, while residential customers used an average of 15,075 kwh per year, or more than three times the national average residential consumption. More than 46% of all homes in Grant County are heated with electricity, and more than 92% of all new homes are installing electric heat at the time of building. We believe this to be a national record for electric utilities of this size or larger.

The Public Utility District of Grant County is managed by a board of five commissioners, elected by the voters of the county, which holds a public meeting each week. Periodic notices are published in the press and on the radio inviting the public to attend these sessions. If a special meeting is held, then the press and radio are notified of the meeting in advance. Usually, at least one newspaper reporter is present at each meeting, and occasionally as many as three are on hand.

We wonder how many other firms operate in a comparable "gold fish bowl" in so far as transacting business is concerned.

It also might be mentioned that in 1960 the Public Utility District of Grant County won the Scattergood Award as one of the three leading utilities in the U.S. in the public power field.

Summing it all up, the Grant County PUD (1) now has hydroelectric developments under construction totaling

(*Reader Comment continues p. 14*)

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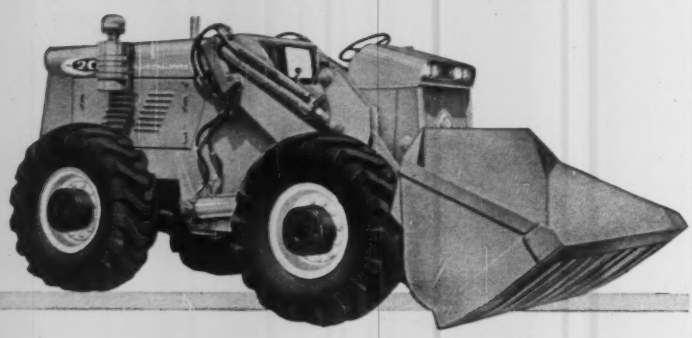

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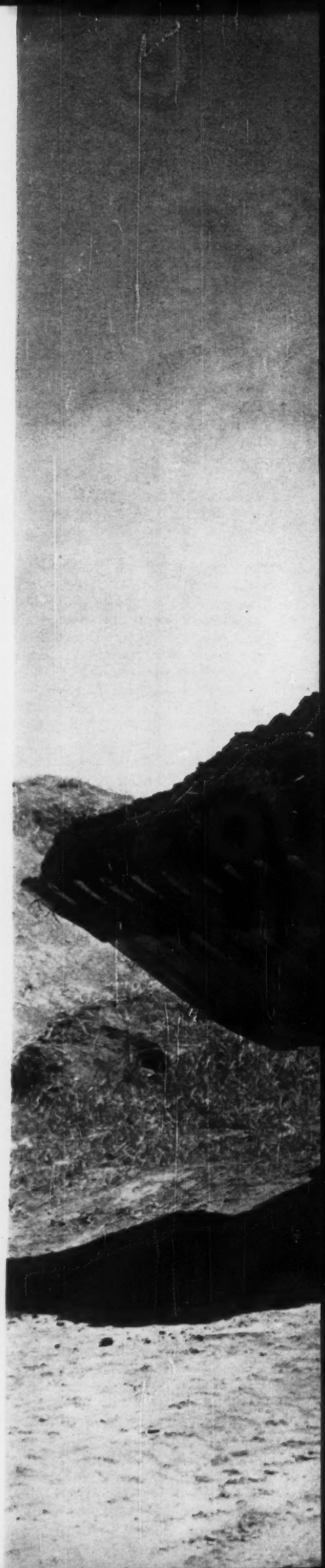

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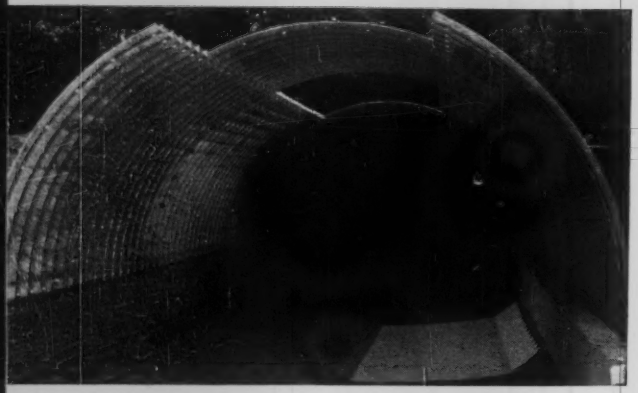
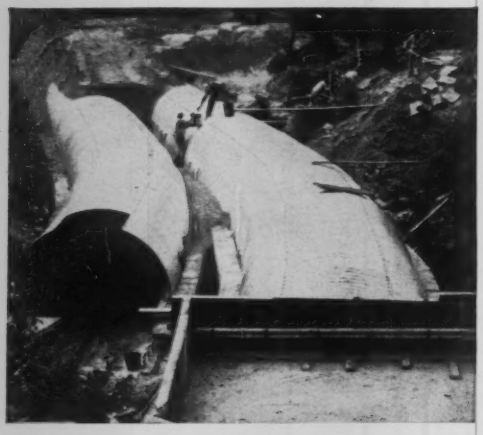
REPUBLIC SECTIONAL PLATE ARCHES HELP SOLVE STORM SEWER PROBLEM IN CLEVELAND



Close-up of one barrel of the storm sewer under construction, shows details of the structure.



Back-filling of the installation will be followed by landscaping to add to the beauty of the park.

An existing storm sewer located in southeastern Cleveland was being seriously overtaxed by runoff from an 800-acre area. Commercial buildings and homes located directly over the structure made enlargement impossible. Adding to the problem, the sewer emptied into an open stream running through Cranwood Park, thus hampering recreational activities.

Following a recommendation of the Regional Planning Commission, Cleveland's Engineering Department designed a second branch of the sewer to handle 390 acres of the area. The two branches intersect at the edge of the park, where they empty into a double barrel Republic Sectional Plate Arch structure.

City Sewer Design Engineer, E. C. Richardson, noted that the type of sectional plate construction employed here has been successfully used in 12 major Cleveland projects. It has proved to be a most efficient and low-cost method for meeting a variety of different design and performance requirements.

THREE-WAY ECONOMY WITH REPUBLIC SECTIONAL PLATE CONSTUCTION

The true cost of a drainage structure includes cost of materials, assembly or labor costs, and life-of-the-structure cost. Republic Sectional Plate Construction gives you exceptional economy in all three areas: initial material costs that are well below the price of other types of drainage structures; simplified design features that eliminate the need for highly skilled labor and make for fast assembly; and the built-in reliability of resilient, galvanized, heavy gage steel.

Fast, easy-joining Republic ELECTRUNITE® GROOVED-END TUBING is a money-saving way to install temporary, semi-permanent, or permanent fluid, gas, and air lines. No threads to cut, fittings snap on to join sections tightly in seconds.

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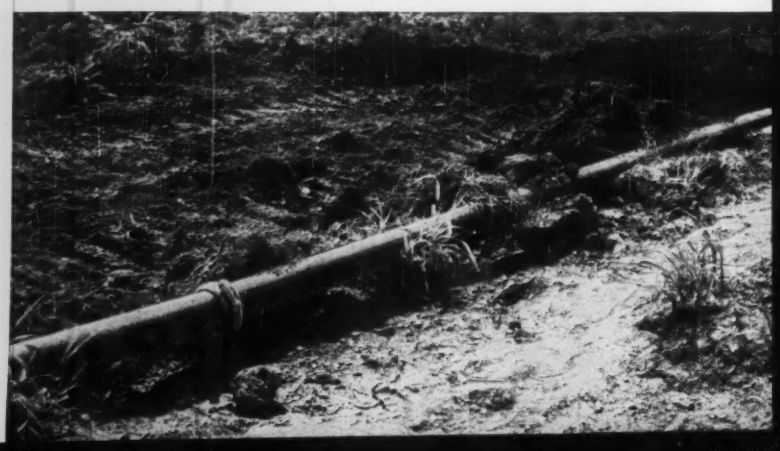

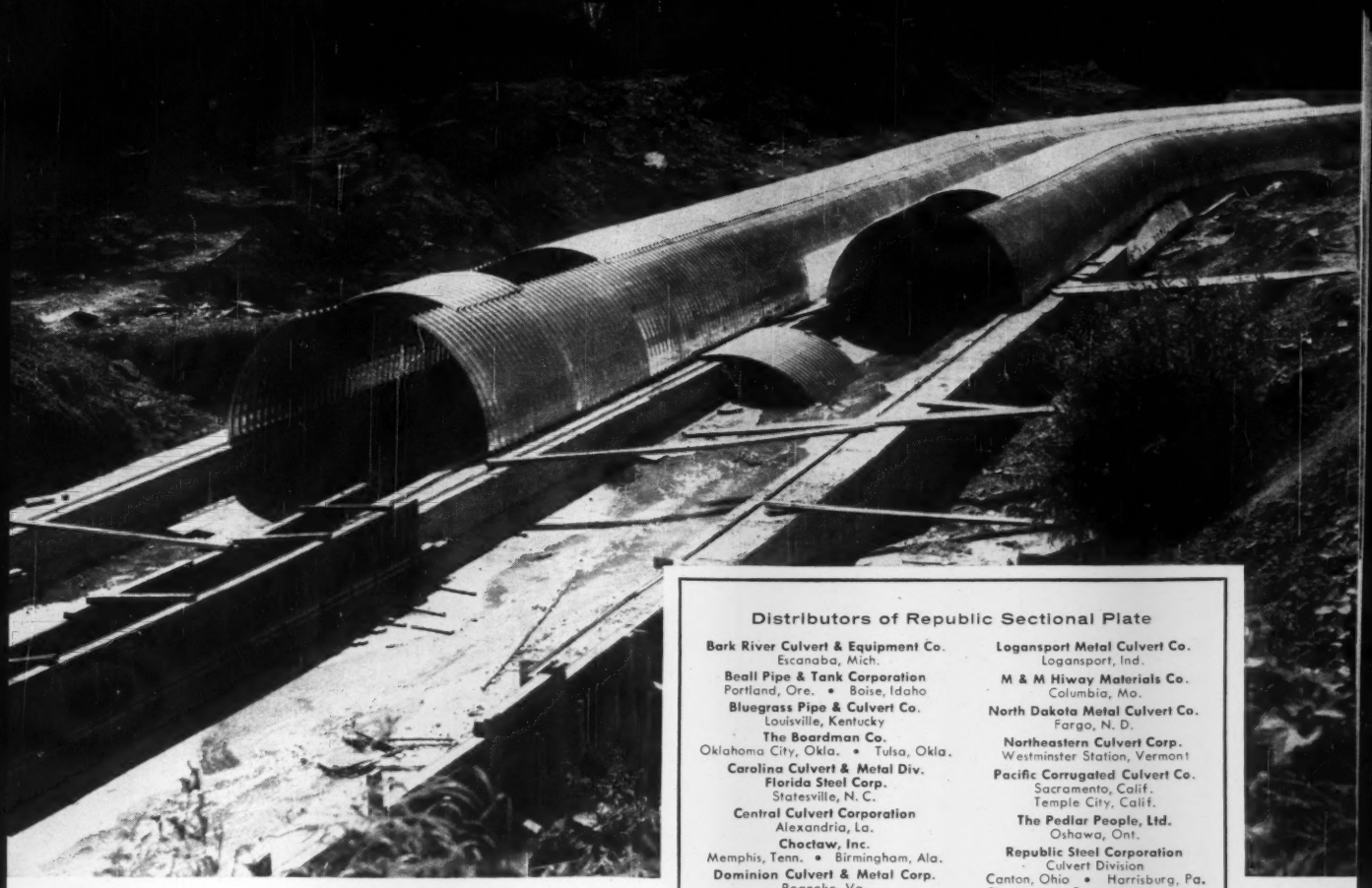

EACH BARREL of the double barrel installation has a 10′0″ span and a 5′2″ rise. The arch is made of 8 gage Republic Corrugated Sectional Plate. Concrete invert has a vitrified liner. Each barrel was designed for capacity of 812 C.F.S. The first installation of this design was constructed in 1934, and proved so effective that city engineers have used it in 11 other major projects.

Architects and Engineers—City of Cleveland, Engineering Division. Louis L. Drassler, Director of Public Service; J. R. Katz, Commissioner of Engineering; Clarence Lillig, Engineer in Charge of Construction; E. C. Richardson, Design Engineer; Square & Marra Construction Company, Bedford, Ohio, Contractor.

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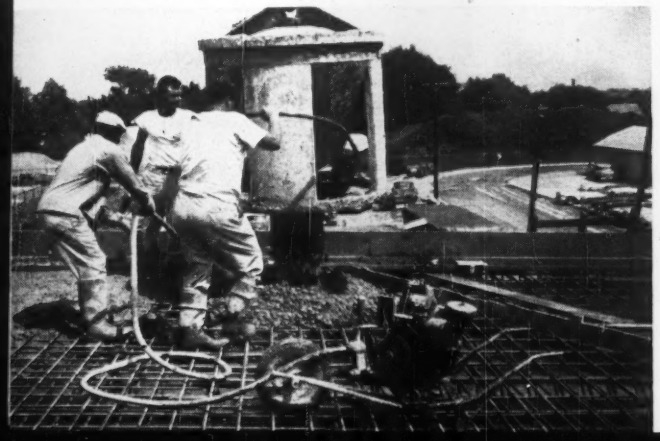

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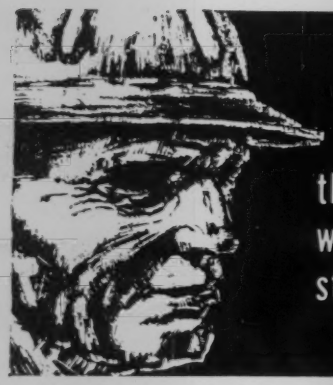

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. . . Reader Comment

$361 million, and this without the use of tax monies or government appropriations, (2) has one of the highest saturations of electric heat of any utility of comparable size in the nation (3) has what is believed to be one of the highest national averages for residential consumption for any utility in the nation of comparable size, and (4) has one of the lowest rates for power of any comparable-sized utility in the nation.

We believe this record should speak for itself in judging whether the Public Utility District of Grant County is "up to the task" of managing Priest Rapids and Wanapum dams.

HERBERT JENKINS
Public Relations Advisor
Public Utility District of Grant County
Ephrata, Wash.

Who's Who at AT&T?

SIR—Your reporter is to be congratulated for her skill in obtaining as much information as she did about "Mother Bell" (ENR Oct. 27, p. 44).

We've found that it is not so much that the company wishes to withold information, as that it is such a colossus . . . and when outside people want information, their problem becomes one of simply finding the right man in the haystack.

MAURICE HEDAYA
H. Sand & Co., Inc.
New York, N. Y.

Trailer Is Fine Spreader

SIR—In regard to your article "How Ohio Built Its Best Bituminous Pavement" (ENR Oct. 27, p. 60), we wish to take exception to your paragraph describing the equipment used in the applying of the fines. You called this piece of equipment an agricultural limestone spreader. The equipment which you made reference to is known as the V Bottom Trailer and is manufactured here at our factory in Gladwin, Michigan.

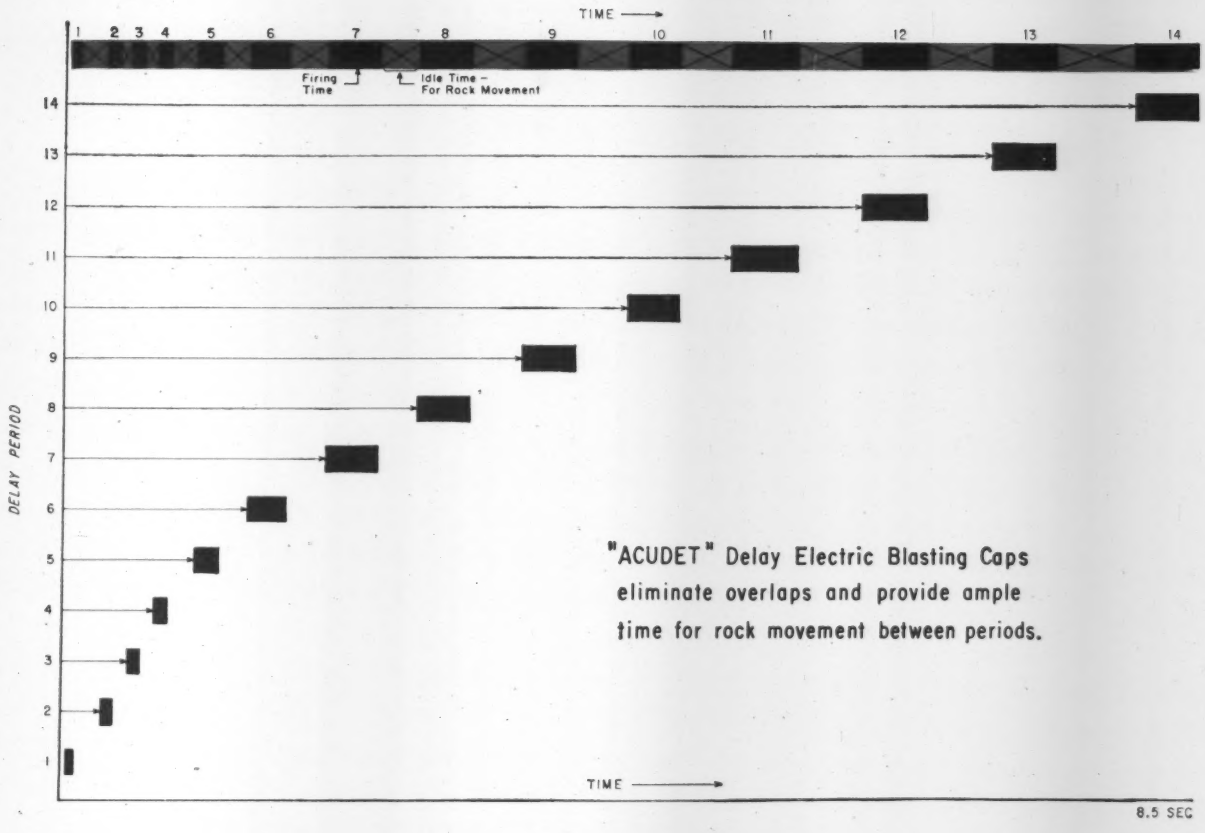
NICK JABE
H. V. Young Oil Co., Inc.
Gladwin, Mich.

'Payola' for Overtime

SIR—Concerning the Blatnik probe into 'payola' to highway engineers in Florida I wonder if perhaps the contractor was merely making an effort to compensate the field engineers for the overtime that they were forced to work in behalf of the contractor as well as the State of Florida. The Blatnik people apparently find it difficult to determine any material gain to the contractor.

Granted, it is unethical and very much open to suspicion for an agent of the state to accept payments or gifts from a contractor. Nevertheless, a good

(Reader Comment continues p. 18)



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Fire . . . pause . . . fire . . . pause . . .

Here for the first time are delay electric blasting caps that are made to fire with a definite time gap between the slowest cap of any period and the fastest cap of the next highest period. THEREFORE overlap is eliminated and time is provided for rock movement between periods.

You have never before been offered this kind of accuracy in delay blasting control.

Du Pont Acudet Delays are manufactured by mechanical assembly to closer timing tolerances than ever before possible, which assures a positive time gap of 1/10 to 1/2 second between periods through the entire series of 14 delays.

The timing of each period and the length of the time gap between periods have been carefully selected to give optimum blasting results under all conditions. For instance, the time gap between the first and second delays is made long enough to allow the rock from the cut to move out of the way before the first relievers go.

In the few months that these new caps have been in the field, Du Pont Acudet Delays have been widely and enthusiastically accepted. Experience in a variety of operations has confirmed these advantages:

1. **Less bootleg**—more advance per round
2. **More uniform fragmentation**—easier mucking
3. **Less overbreak**—better shearing action
4. **Shorter shells**—easier to make primers
5. **Aluminum shells**—corrosion resistant
6. **First period fires in 1/40 second**—no need for special timing or circuit breaking equipment.

Like all other Du Pont Electric Blasting Caps, Acudet Delays are mechanically assembled with nylon plastic insulation, rubber plug closures, and shielded shunts.

Ask your Du Pont representative or distributor *now* for detailed information on the phenomenal accuracy of Acudet Delays and what this means for you in your operation.

Call him direct or write to Du Pont, Explosives Department, 6440 Nemours Building, Wilmington 98, Delaware.

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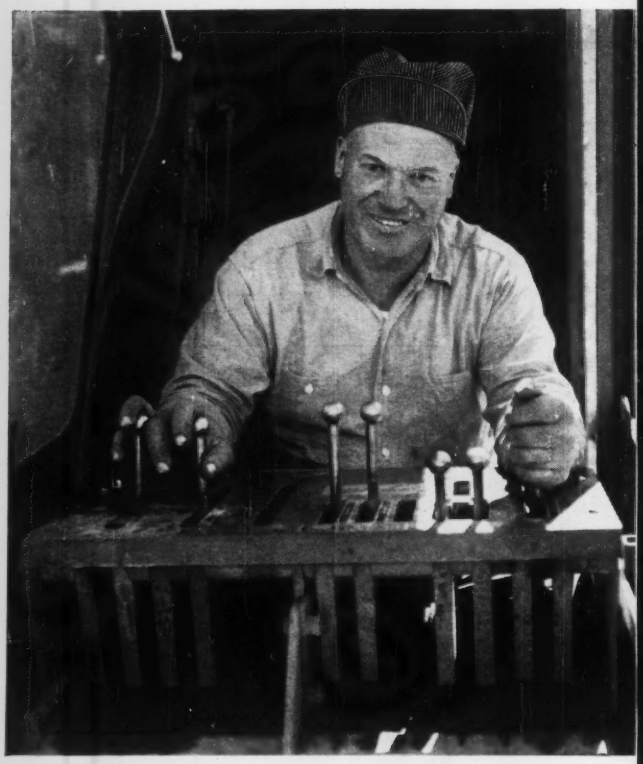
Straight talk



on shovel-crane controls

ONLY ONE SHOVEL-CRANE MAKER FULLY UTILIZES TRUE POWER-HYDRAULIC CONTROLS

Until recently, other shovel-crane builders completely ignored power-hydraulic controls, or were content to merely augment their outdated mechanical controls with booster-type systems — so-called "power" controls. Only in the last few years have some of these manufacturers begun to offer a power-hydraulic control, *though strictly on a limited basis* . . . not on all models and not for all machine functions. Some machines even employ 3 different control systems.

Now look at Link-Belt Speeder. The company first pioneered power-hydraulic controls for shovel-cranes in 1936, 25 years ago. Then, in 1954, Link-Belt Speeder made this modern, proven Speed-o-Matic system standard on every machine in its wide line. Today, the controls are used for every machine function . . . *are the same on each and every rig.*

JUST NUDGE THE LEVER

The years-ahead Speed-o-Matic system employs the instantaneous force of oil under pressure — all the way from the control levers to the operating clutches. And, since oil is noncompressible, clutches respond the instant additional pressure is metered into the clutch lines. Absolutely no wait for pressure to build up.

Short-throw Speed-o-Matic control levers are panel-mounted for operator convenience and ease. By simply nudging one or more of these levers, a crane operator, for example, can boom up or down, hoist or lower a load, swing, travel . . . independently or in suitable combinations. And every machine response is **instantaneous, oil-smooth, precise!**

For example, on a machine equipped with reversing clutch (or clutches) on the operating drums, the Speed-o-Matic operator can power down the heaviest or lightest loads with hairline accuracy. Fingertip-sensitive control levers provide exact in-hand feel of the load.

AIR CONTROLS TEND TO LAG

How many manufacturers actually *recommend* air controls for crane work . . . especially on the swing . . . or on the hoist, for that matter? Waiting for pressure to build up can be serious business, resulting in a dangerous lag. The operator cannot expect the same degree of precision and safety as with instantly responsive power hydraulics.

With the Speed-o-Matic system, hydraulic lines are constantly full of oil, permitting the operator to meter the desired pressure to the various clutches without the hazards of waiting for build-up. For *more pressure*, he merely eases the lever forward (or reverse). To *release*, he returns the lever to neutral.

AIR CONTROLS DEMAND EXTRA SERVICE

Air controls, for one, present their share of servicing headaches. Dirt and moisture prove a major worry . . . not to mention freezing, filter maintenance and other downtime annoyances. And most components of these systems are purchased from outside sources.

The Speed-o-Matic system, on the other hand, is

unaffected by normal changes in temperature or atmosphere, and requires only seasonal oil changes. It's an open system, *with no need to prime or bleed.* Basically it's the same reliable system used on aircraft. And all components of this modern system (except pump) are designed and manufactured by Link-Belt Speeder.

POWER-ASSISTED CONTROLS FALL SHORT

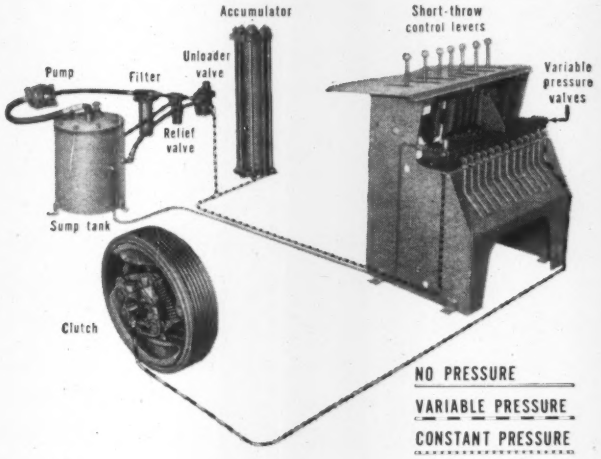
Manual hydraulic, air or mechanical booster systems offer a power assist to just a limited number of shovel-crane functions . . . **not all operations,** as with Speed-o-Matic. On some machines, to illustrate this point, only the main operating drums benefit from power controls, and on some mechanical booster systems, it is recommended that the booster be disengaged for crane work.

MECHANICAL CONTROLS DEPEND ON MUSCLE

Obsolete long-lever controls, of course, enjoy no power assist whatsoever. Still used on small machines, they are bulky and slow; they hand-fight the operator, contribute to his fatigue, hold down his production . . . require frequent adjusting. They simply do not compare to power controls.

SPEED-O-MATIC POWER-HYDRAULIC SYSTEM LETS OIL UNDER PRESSURE DO THE WORK

By means of variable pressure control valves, the operator meters oil pressure to each operating clutch. For more pressure, he lengthens the stroke of the lever to increase the force of the spring. This, in turn, moves the piston to admit more oil from the



valve bank. Response is prompt, positive and smooth. Pressure at the valve bank is kept constant (between 900 and 1050 psi) by the system's accumulator, which explains why the engine-driven pump operates against pressure only 5% of the time.

CLUTCHES SELF-ADJUSTING

Speed-o-Matic eliminates more than 150 working parts. There are no bushings, pins, links, clutch toggles. All actuating mechanism is oil-immersed. A micronic-type, replaceable oil filter keeps oil clean.

Interchangeable Speed-o-Matic clutches require far less operator attention. Even minor adjustments are spread weeks or months apart. Why? Hydraulic-actuated pistons automatically compensate for normal lining wear, heat expansion or temperature changes.

SPEED-O-MATIC CONTROLS MAKE EVERY JOB MORE PRECISE—FAR SAFER! This Link-Belt Speeder HC-98A truck-crane places forms, sets steel and pours concrete on high-reach assignments with pinpoint accuracy. Instantly responsive, Speed-o-Matic eliminates dangerous jump, jerk or lag.

PERFORMANCE AND PROFITS—A LONG-RANGE LOOK

Today, shovel-crane buyers simply cannot afford to relegate machine controls to secondary importance . . . cannot afford to buy experiments. A less efficient control system can penalize a rig in performance and profits for years to come.

See your local Link-Belt Speeder distributor for details, or write for illustrated literature. LINK-BELT SPEEDER CORPORATION, Cedar Rapids, Iowa.

1936 - 1961 . . . 25th ANNIVERSARY OF SPEED-O-MATIC CONTROLS

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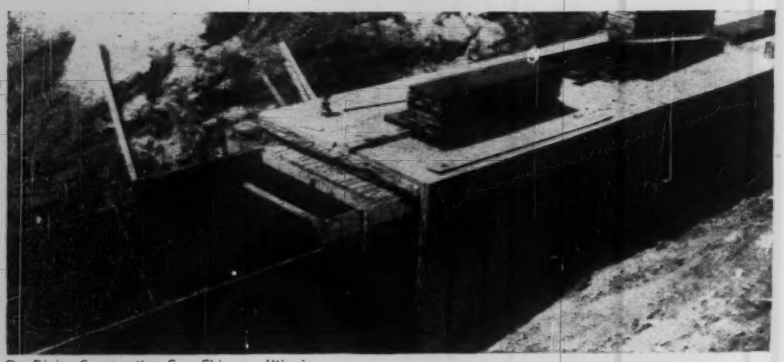

Orr-Divito Construction Co., Chicago, Illinois

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. . . Reader Comment

workman is worthy of his hire and a state engineer is entitled to extra compensation for the overtime work that is the rule on projects under construction.

State highway departments could very easily pay their field personnel for overtime work on construction and charge part of the overtime to the contractor since both the state and the contractor are the beneficiaries.

It appears that some state highway departments could do more to earn the loyalty of their personnel in the field and raise their morale so that they would be proof against bribes.

JOHN T. SPANN, JR.
San Angelo, Texas

Where Are the CE's?

SIR—A great deal is heard—and written—nowadays about the relatively low status of civil engineers as compared with other categories. Perhaps it is their own fault.

I have in front of me a brochure announcing the Annual New Jersey State Planning Conference. The subjects deal with provision of space for more population, renewal of cities and towns, needed public facilities, continuous master planning, subdivisions and maps. Every item deals with the very lifeblood of civil engineering work: land use, streets and highways, utilities, zoning, planning, maps. Yet how many civil engineers are guiding this conference? By actual count, a list of 37 moderators and panelists who will guide this conference contains only five professional engineers.

Inasmuch as ultimately all municipal work is handled by professional engineers, isn't it high time that civil engineers have more of a role in all such planning? Won't such a role add to the civil engineer's status?

L. TARNOPOLL
L. Tarnopoll and Associates
New York, N. Y.

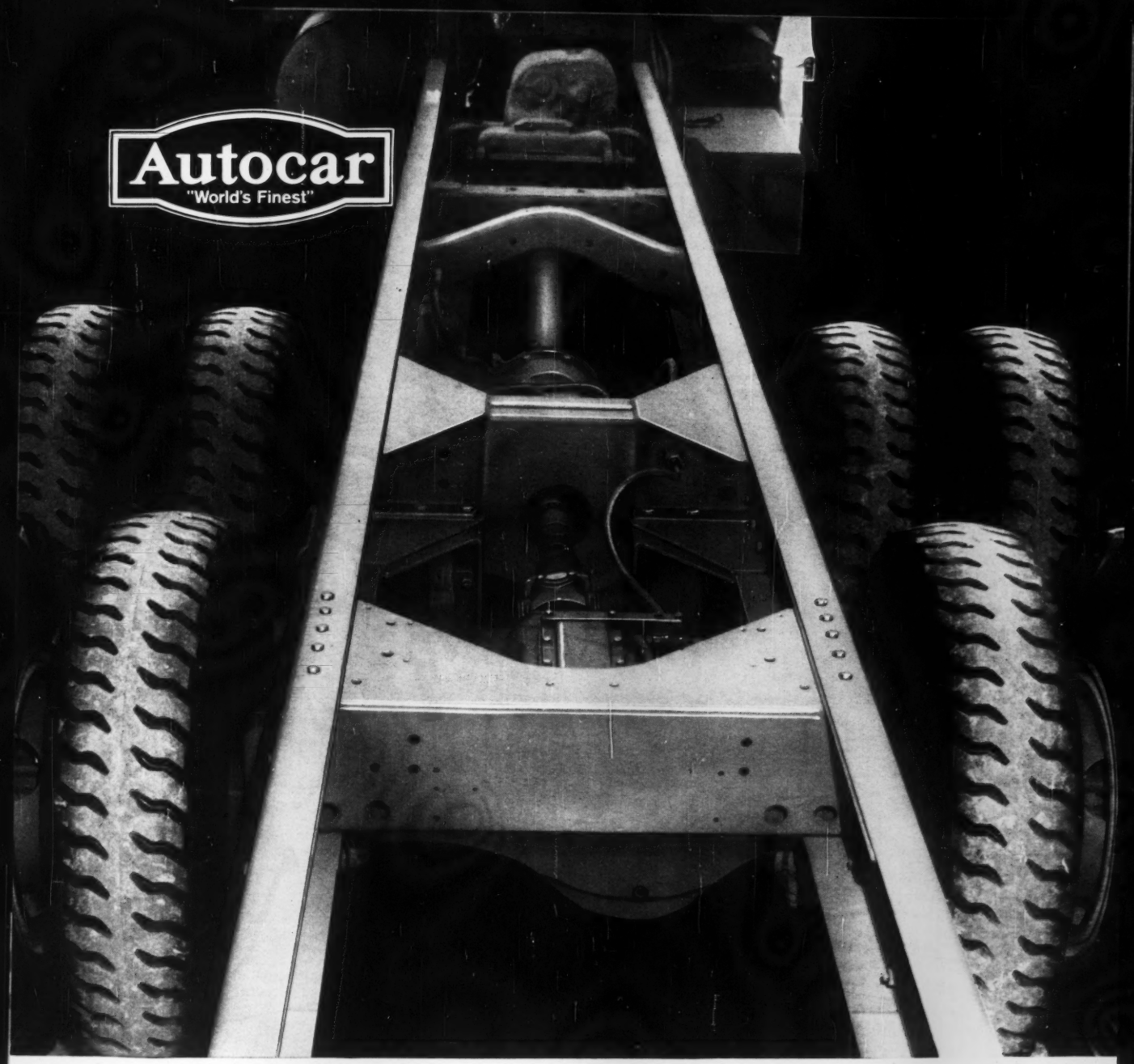
PR Cement Steady

SIR—May I suggest that you recheck the data on Puerto Rico shown in the Costs 'Round the World section of your issue of Sept. 22, 1960.

The price of Portland cement has remained constant at 95 cents per 94-lb sack instead of rising to $1.05 as shown in your table on p. 72.

H. C. BARTON, JR., DIRECTOR
Office of Economic Research
Economic Development Administration
San Juan, Puerto Rico

Editor's Note: Mr. Barton is correct in pointing out that cement prices in Puerto Rico remained stable in 1960. The Costs 'Round the World table (ENR Sept. 22, 1960, p. 72) gives a 1960 price of $1.05 per sack for Portland cement, fob San Juan. A recheck of 1959 data shows that the price of $0.95 per sack is an fob plant price.



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ENGINEERING NEWS-RECORD

Vol. 166, No. 4 January 26, 1961

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THE CONSTRUCTION WEEK

CREDIT INSURANCE WANTED—The National Constructors Association is urging the new Administration to provide credit guarantees for contractors working abroad. They say protection against such things as foreign currency devaluation, political upset or expropriation of equipment would help U. S. firms compete more effectively against foreign contractors.

NOTHING DOING?—Montana's new governor has proposed a moratorium until 1963 on all new state construction except highways. But Gov. Donald E. Nutter, a Republican, is outvoted by a Democratic attorney general and secretary of state on the State Board of Examiners, which passes on state construction. The Democrats oppose the moratorium.

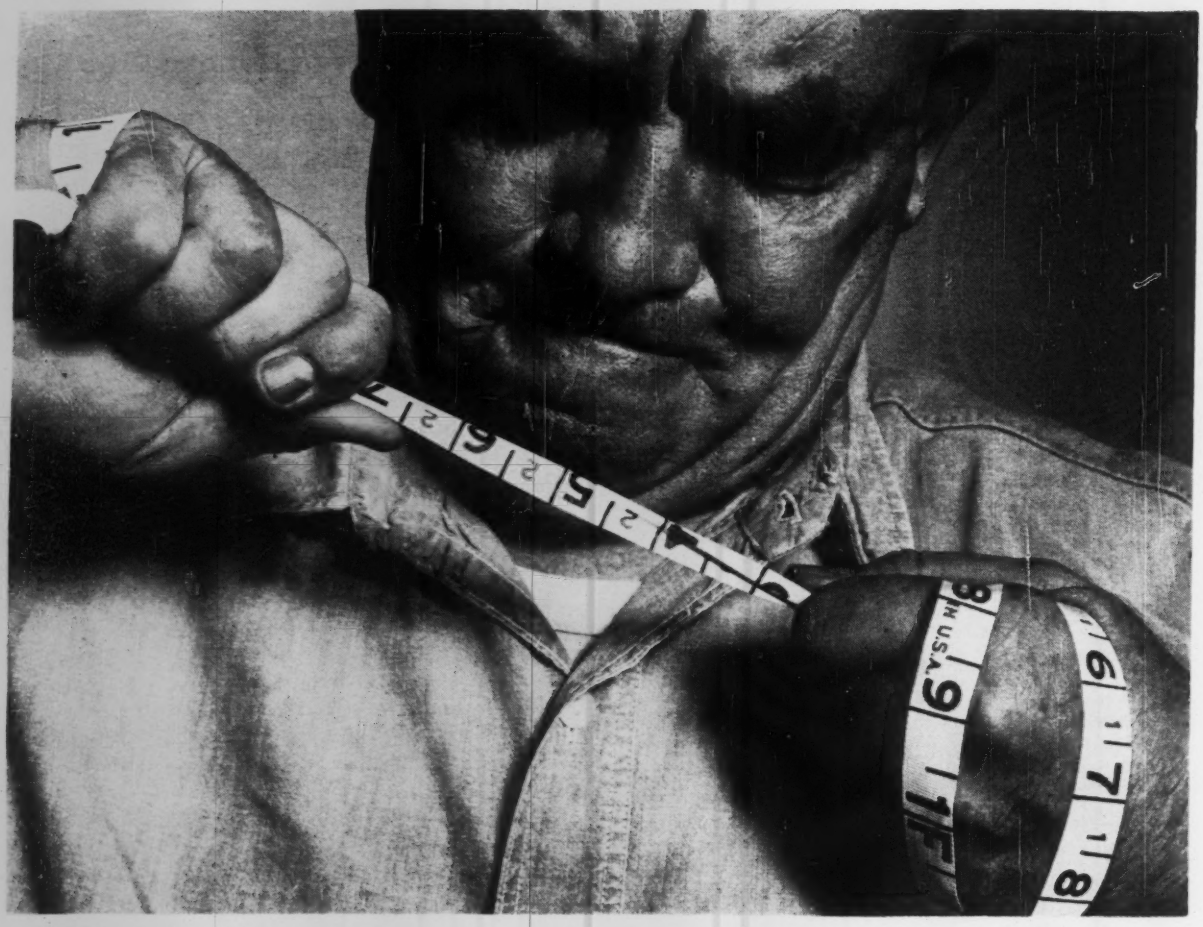
SEATON'S LAST STAND—Ike's Interior Secretary Fred Seaton stirred up a public-vs-private power rhubarb before he left office by ruling that transmission lines for the Upper Colorado Project (which includes Glen Canyon, Flaming Gorge and Curecanti dams) will be built by the U. S. The decision involves 2,000 miles of lines costing an estimated $157 million. Private power interests in the five-state area affected say their lines can handle the load and they will fight congressional appropriation for federal construction.

LAST CONVERSION SITE—Wrightsville Beach, N. C., will be the site of the fifth and last of the demonstration seawater conversion plants to be constructed for the Interior Department's Office of Saline Water. The 250,000- to 350,000-gpd desalter will use a still-to-be-selected freezing process.

MISSILE BASE MISERIES—The missile base construction program is still fouled up, according to corridor conversations among executives of top construction companies at last week's Beavers meeting. They say the Army's new Corps of Engineers Ballistic Missile Construction Office hasn't really straightened out the troubles that got so much publicity last summer (ENR Aug. 11, 1960, p. 26).

ELECTRICAL ANTIFREEZE—The Texas Highway Department is experimenting with electricity to prevent icing on the decks of twin bridges near Wichita Falls. The electrical heating elements were built into the concrete decks during construction of the bridges.

USE TAX—The City Council of Dahlonega, Ga., will decide shortly whether to levy a monthly tax of one dollar on each commode in the community to help finance expansion of the town's water and sewerage system. Although Mayor J. W. Woodward says such a tax would fill the bill, he adds it "may be too unusual."



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WASHINGTON OBSERVER

- **Accord tied to appointments?**
- **No pump-priming with highways**
- **Threat to billboard bonus**

● **The fact that two leaders of AFL-CIO building trades unions did not receive appointments in the Kennedy Administration may frustrate discussions of a craft union "no strike" pledge against missile bases.** At best, it will put the vaunted compromising abilities of Labor Secretary Arthur J. Goldberg to a difficult test.

There is hope in the fact that AFL-CIO president George Meany does not blame President Kennedy personally for the latest development—failure to appoint Joseph D. Keenan, secretary-treasurer of the International Brotherhood of Electrical Workers, to the top Defense Department manpower post. Earlier, the new Administration had passed over lathers' president Lloyd Mashburn for Undersecretary of Labor.

Mr. Meany blames Defense Secretary Robert S. McNamara for the Keenan episode. He says Mr. McNamara is "anti labor." Mr. McNamara denies the charge, saying he has a better manpower chief in mind, and Mr. Kennedy has allowed him to choose his own man. Other labor leaders are inclined, for the moment at least, to go along with Mr. Meany's appraisal of the situation.

Mr. Goldberg intends to press for quick settlement of missile base labor disputes, despite any misgivings on the part of craft unions. He will seek to end the disharmony by emphasizing that the urgency of missile readiness transcends personal differences.

● **Mr. Kenndy's fiscal advisers take a dim view of public works spending as a near-term economic stimulant.** They feel planning and contract awards can't be speeded sufficiently to push government funds into the economy fast enough to meet immediate recession needs.

This may mean continuance of the pay-as-you-go principle in highway construction.

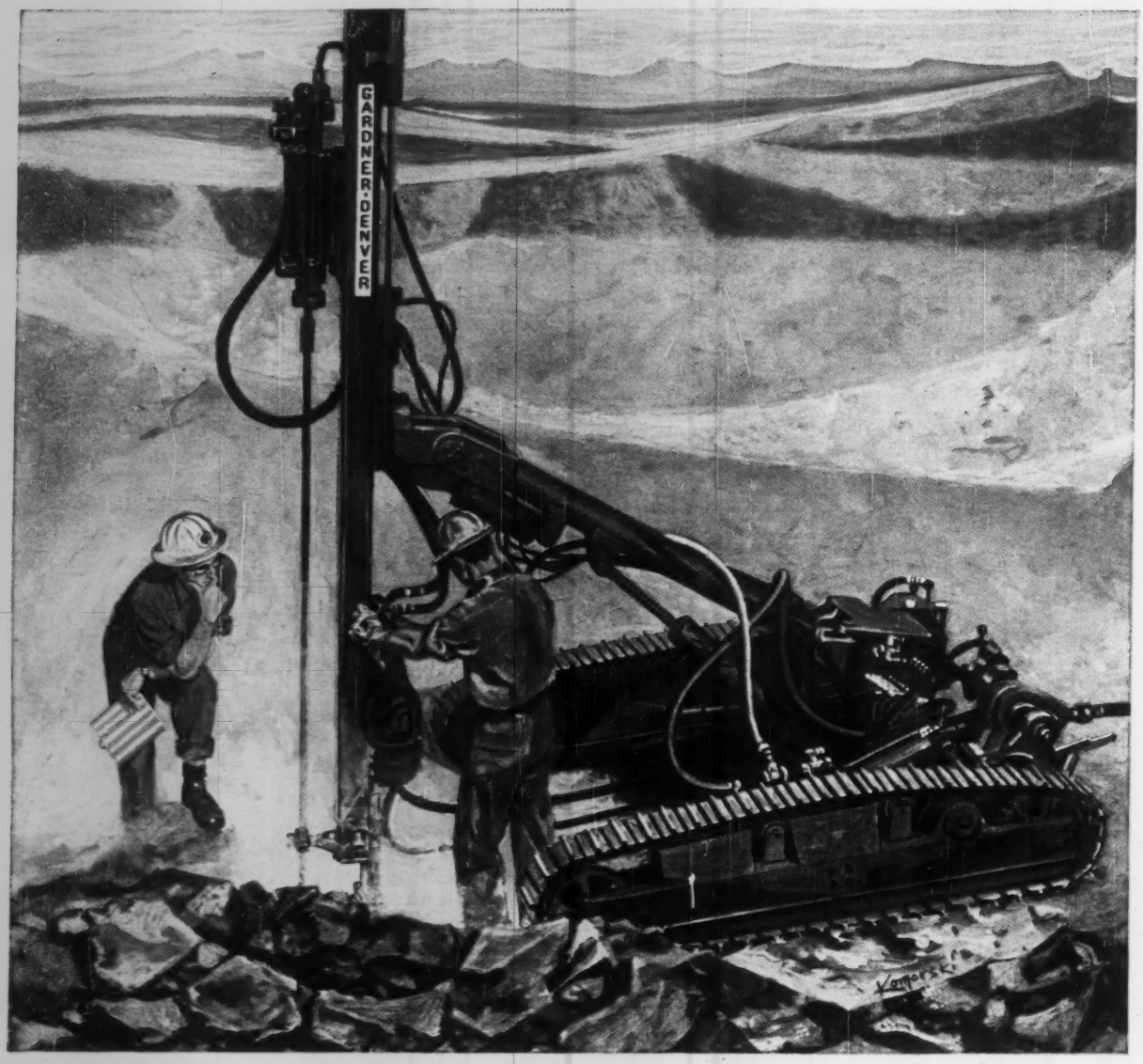
The Samuelson task force suggested that Mr. Kenndy consider abandoning this principle and accelerate highway construction as a "potent near-term stimulant."

But Commerce Secretary Luther H. Hodges has opposed this proposal. For the moment at least, the Administration does not contemplate asking Congress to permit an abandonment of the pay-as-you-go principle, as was done in fighting the 1958 recession.

● **Rejection of a billboard industry proposal to double the size of signs permitted in settled areas along Interstate highways** is recommended by the American Automobile Association. It says this proposal would negate the purpose of the federal bonus for control of highway advertising.

Maryland has become the first state to qualify for this bonus. It will collect an estimated $1.7 million over the life of the program under an agreement signed by the state and the Bureau of Public Roads.

Five other states are in line for similar qualification. They are Wisconsin, Connecticut, Kentucky, North Dakota and Virginia. The bonus provision, passed in 1958, expires June 30.



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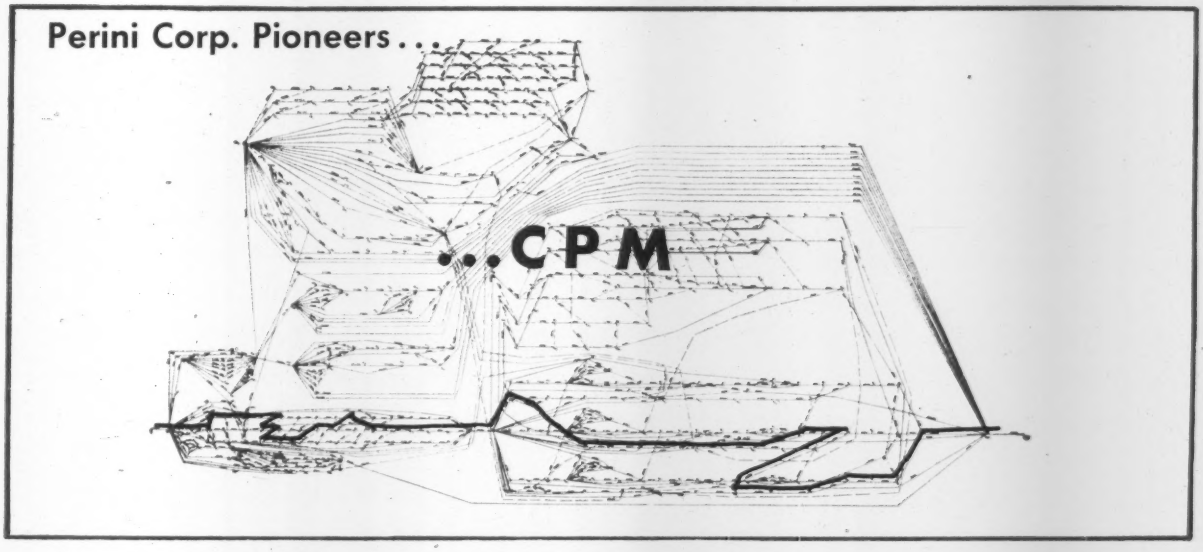


New Tool for Job Management

The time-tested bar graph for depicting construction schedules may be on its way out.

A straight line diagram that is more than a schedule—truly a project plan represented graphically—may be taking its place.

It's called the Critical Path Method, and it's a radically new tool for construction management for the planning, scheduling, estimating and control of engineering or construction projects.

It was first used by DuPont in early 1959 to schedule plant maintenance shutdowns. And just last month at Perini Corp.'s annual meeting in Boston, the method was introduced to top management by the managers of its Canadian companies, who have used it.

Acceptance of the method by the diverse and progressive Perini organization brings it from the specialized repetitive processes of plant maintenance and piping change-overs to the complex construction of buildings, as well as to heavy construction processes. It is also applicable to the planning of engineering design.

Perini managers listened with mixed feelings as their Canadian associates described CPM. Among the older construction stiffs present there was a tendency to shrug it all off as too complicated. For certainly it is complex at first introduction. But genuine interest was stirred among many; there's real enthusiasm among those who've used it.

Most important, top management in this top construction company sees a real future for the use of the Critical Path Method. They're happy Perini Corp. has the jump on competitors with its use. Lou Perini himself is enthused.

Perini's people have learned all they know of CPM in the past year. The management method itself is only a couple of years old.

It all came out of a job that Remington Rand Division of Sperry Rand Corp. did for E. I. duPont de Nemours & Co. in 1957. James E. Kelley, Jr., who devised the method while with Rand in '57, is now with J. W. Mauchly of Mauchly Associates, Inc., in Ambler, Pa.

Mauchly Associates contacted Perini Ltd. just over a year ago. Robert Curry, who is area engineer for building construction in the Montreal area, took Mauchly's course in CPM, came back to Toronto impressed.

A few others in the Toronto office took a "crash" course in the method.

Mauchly's consulting service consists largely of instructing its clients in the application and advantages of the CPM method. Mauchly also takes on the formulation of time-cost curves and the programming of time-cost problems for electronic computation for its clients.

While Perini Ltd. was developing its handful of experts on CPM in Toronto, Perini Pacific Ltd. called Mauchly Associates to Vancouver, B. C., to study a heavy construction operation on its Port Mann Bridge foundations.

Faced with a February '61 completion date for bridge foundations, Perini had to speed up a pile-placing process it had under way using the Benoto drilling machine imported from France. This machine drills holes, places caissons, inserts piles and pulls the caissons.

This production cycle was analyzed, and it was shown that if a separate machine were put to pulling the caissons the cycle time could be cut from 36 to 27 hours. The time saving justified cost of the new machine.

Perini is not the only construction company using Mauchly's services.

The Parco Company Inc., a so-called job shop offering design and drafting services in New York City, tells its clients it has associated with Mauchly to do project planning by CPM.

Many other companies have expressed interest in the method for construction management. Mauchly lists among its clients Catalytic Construction Co., Foundation Co. of Canada Ltd., Lummus Co., and others.

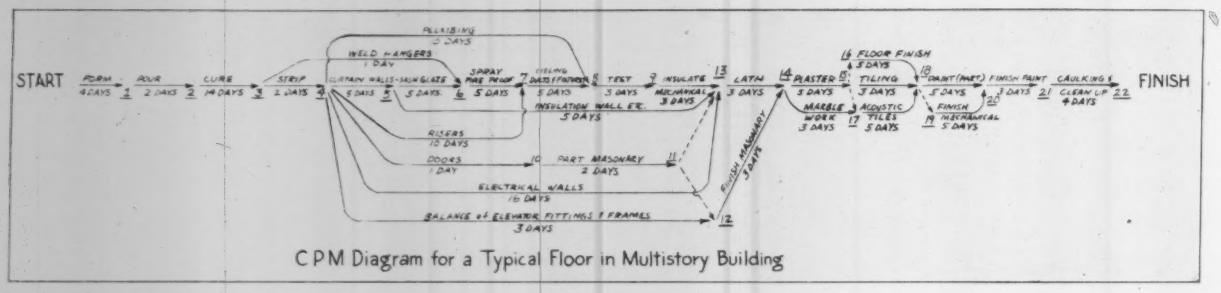
But Mauchly people say Perini is the construction organization to get most use of their services so far.

How many more will follow suit and how fast remains to be seen.

If others duplicate the Perini experience, the familiar bar chart is indeed to be displaced. Construction and engineering management is about to latch on to a shiny new tool.

(For how CPM works on a building job, please turn the page.)

. . . What CPM is and how it works for Perini in



CPM Diagram for a Typical Floor in Multistory Building

NEW LINE DIAGRAM shows relationship of one task to another in the work of a typical floor.

What is CPM?

Key to this technique of planning, scheduling, estimating and controlling complex construction jobs is a diagram made up of arrows, each arrow representing a specific job.

The CPM diagram gets to be a fairly involved looking thing for, say, the construction of a multistory building. But then, the construction of a multistory building is no simple matter, and Perini people have found it's better to have an accurate, albeit complicated, sketch to indicate the procedure than to have no plan at all. And they consider the old bar chart hardly better than no chart at all when compared with the straight line sketches of CPM.

The diagram above is just a very small piece of the total CPM drawing for the 43-story structure Perini is building. The whole diagram covers a sheet 3x7 ft. But the whole thing is made up of many pieces that are not much different from this.

The total diagram for the building begins with lead time for work with drawings and specs: 20 days for building a construction office; 10 days for surveys; excavation, piles, footings, etc. It picks up with steel erection and goes right through all installation and construction steps—through landscaping, final checkout and inspection—to completion on Aug. 15, 1962.

The beauty of the straight line diagram is that it can be made to show relationship of every task to every other (which the bar chart can't do.) And, most important, it can be made to show which jobs on the project are the critical ones, the ones that can affect completion time for the project. Only the jobs, from start to finish of a project, that relate to one another, each depending on completion of the one before it, can be critical jobs. It is the sum of the time the critical jobs will take that will be the total project time. It is the path that the lines representing these jobs take through the project's diagram that is the critical path from start to finish of project. Thus the name: Critical Path Method.

How does CPM work?

You draw an arrow from left to right, representing the first job to be done, and you label its left end 0 and its right end 1; that's job (0,1).

If another job can be started once (0,1) is finished, you draw another arrow from point 1, representing job (1,2).

Perhaps when this job is done there are three other things that can be started. You draw three arrows out from point 2 to represent jobs (2,3), (2,4) and (2,5).

And so you go.

It's simpler than it sounds and looks at first. Perini men who have learned it were quick to get the hang and find it easy to read.

Actually, the diagram is only the beginning. It's the model by which you can see the jobs to be done to get a complicated project finished.

Next step is to give the model scale by introducing time and cost for doing each job on the project. You simply go through your diagram, putting down the time each job normally should take and what you estimate it should cost to do each job in the specified amount of time.

With each job given its time scale, the jobs that control time needed for the project as a whole add up to total project time.

It's obvious that only by cutting the length of time for the jobs that are critical jobs can the project's completion time be shortened. You can check into the cost of speeding up jobs along the project's critical path to see if the time saving is worth the expense.

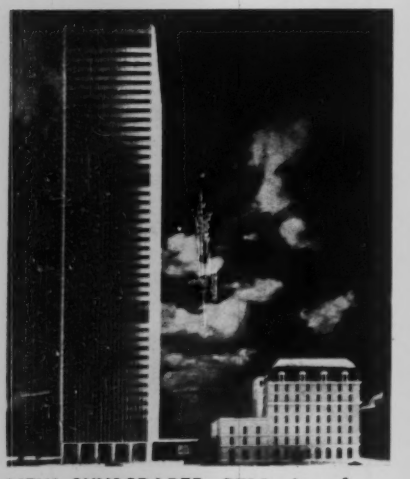
Here's where the computations can become complicated and the problem can best be done by a computer. CPM can be formulated for electronic computations; cost curves can be drawn for each job and for the project as a whole, so you can find out by computer just how much it would cost to speed up any part, or the whole project, to any given degree—and decide whether it's worth it.

Perini's people have not taken CPM to its ultimate.

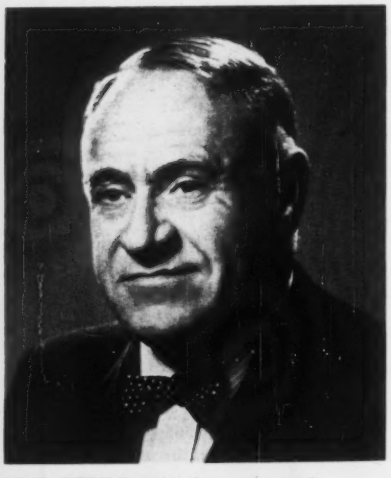
Just to see how it would work they have had computed the cost of cutting 10 days' time off a given project. But they haven't put the mathematical possibilities of CPM to real use on building construction.

They've used it primarily "to see the job better."

Says Dennis Hinton, vice president

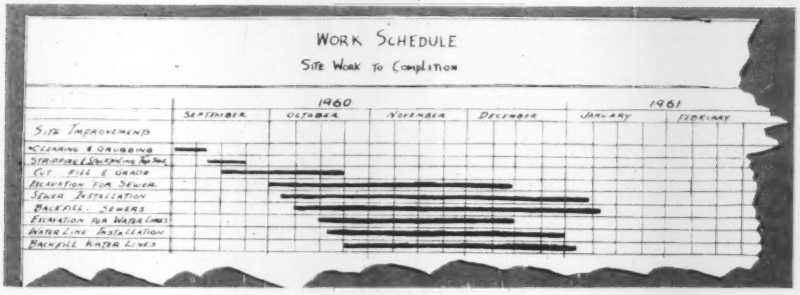


NEW SKYSCRAPER—CPM planned.



LOU PERINI—Old dog, new tricks.

building construction



OLD BAR CHART is OK as a schedule, but has its limitations.

of Perini, Ltd., in Toronto: "It's given us a finer appreciation of what's in a building. Due to all the manufactured components, building construction is a massive coordination job. Expediting goes way back into manufacturing.

"Experience in building work pays off, but new buildings involve new building products with which we have limited experience. Bar charts don't show us these things. Neither does construction know-how."

Mr. Hinton speaks from the experience of having used CPM in the construction management of two or three different high rise buildings, which Perini, Ltd., has under way. On one skyscraper, he says, CPM has shown where certain things had to be expedited; it showed distinctly (what might have been guessed) that structural steel erection was not as critical to the over-all schedule as how fast they could fireproof it.

Since Perini, Ltd., applied CPM to planning of the Montreal office building, it has used it on a couple of other building jobs and on a sewage treatment plant for purposes of making and submitting bids.

Perini people are convinced that using CPM during estimating to see the time element more accurately can be a great assist in bidding—as well as helping to assess indirect costs that run through the life of the job.

They point out also that the CPM diagram gives subcontractors a better picture of how their tasks relate to the whole project, what other jobs depend on theirs. It offers a "vehicle" for evaluating alternate strategies. It provides protection against "forgetting" any specific job. And, if the time elements are programmed for a computer, a new completion time for the most complex project can be figured after any schedule-disrupting delay occurs.

Federal Action Urged on Resources

The Kennedy task force on natural resources last week laid down broad outlines for increasing federal activity in the development and conservation of this country's natural resources.

Water got the lion's share of the study group's attention. The 12-page report included sections on flood control and land reclamation, small watershed development, power (including hydroelectric energy), navigation, and water pollution control. It also treated wildlife conservation, forestry and national parks.

The Eisenhower Administration's budgetary policy came in for sharp criticism. "We welcome the end of the 'no new starts' policy," the group declared. "We believe that the national budget policy should distinguish between capital investment and operating expenditures in the natural resources field."

The group recommended easing of local participation requirements as a condition for federal action. "The tendency in recent years of the Bureau of the Budget to discourage any projects by excessive requirements for local interest should be modified to meet realistic water needs," the document stated. "Special consideration should be given to the problems of undeveloped and depressed areas."

Fast federal action to increase grants to municipalities for sewage-treatment plant construction got strong endorsement from the task force. "One of the earliest enactments of the Eighty-Seventh Congress should be the Blatnik Pollution Control Bill, vetoed in 1960," the report asserted.

The Blatnik Bill, vetoed by President Eisenhower in February of last year, would have increased the amount of federal matching money available to communities under the 1956 Pollution Control Act from $50 million to $90 million a year.

The original version, introduced by Rep. John A. Blatnik (D., Minn.), called for $100 million a year but was amended by Senate-House conferees to the lower figure before it went to the White House. Rep. Blatnik is introducing a similar bill in the new Congress.

The report calls for a "positive policy of keeping waters as clean as possible, as opposed to the negative policy of attempting to crowd into a stream all the wastes it might possibly assimilate."

The report calls for vigorous action on flood control and reclamation projects. "Highest priority should be given to the completion of urgently needed flood-control projects already authorized," the group urged, "and earliest possible action should be taken toward authorization of projects that have been often delayed because of unreasonable Bureau of the Budget restrictions."

The report also asserts: "The reclamation of land should be restored as an essential part of our natural resources program. The continued development of supplemental water supplies for existing irrigated acres and the opening of new lands for settlement through reclamation are entirely consistent with long-term national objectives."

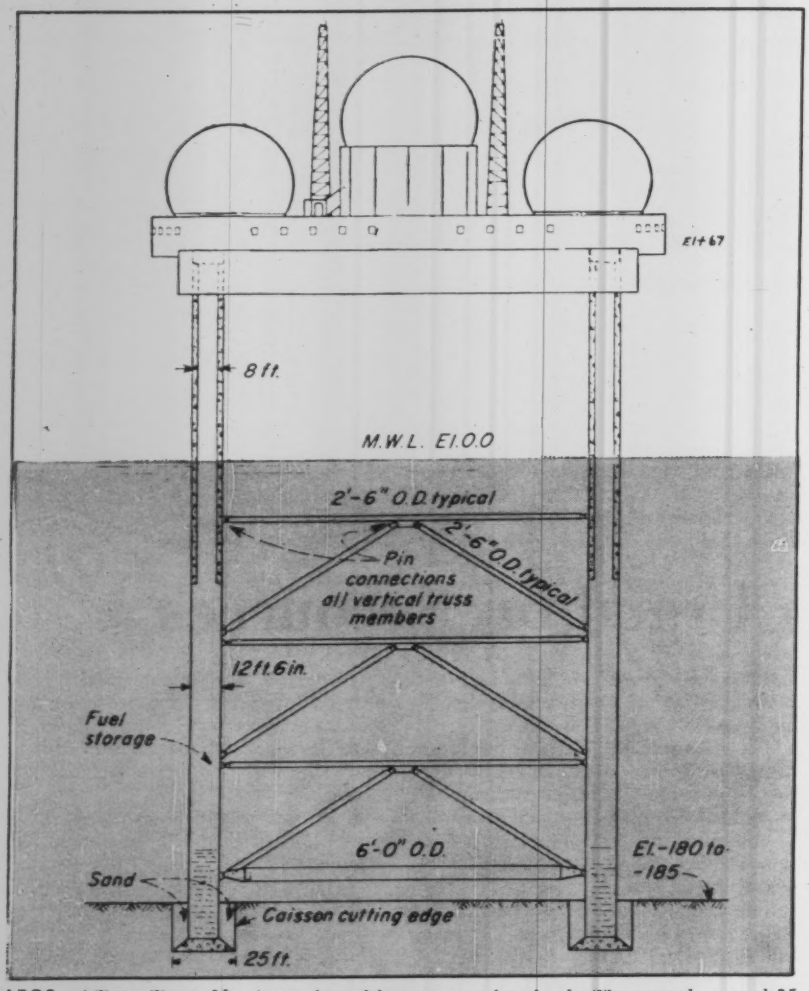
The task force recommended a forceful drive on small watershed development. The group proposed that "Administration policy should include a goal of 2,000 watersheds completed or under construction by 1968."

Federal power development should be increased, the group reported. "The Department of the Interior, in cooperation with other agencies, must reassert its responsibility to provide long-range planning of generation and transmission facilities to meet future needs, with immediate attention to the economic necessity of inter-regional federal transmission ties," the study group declared.

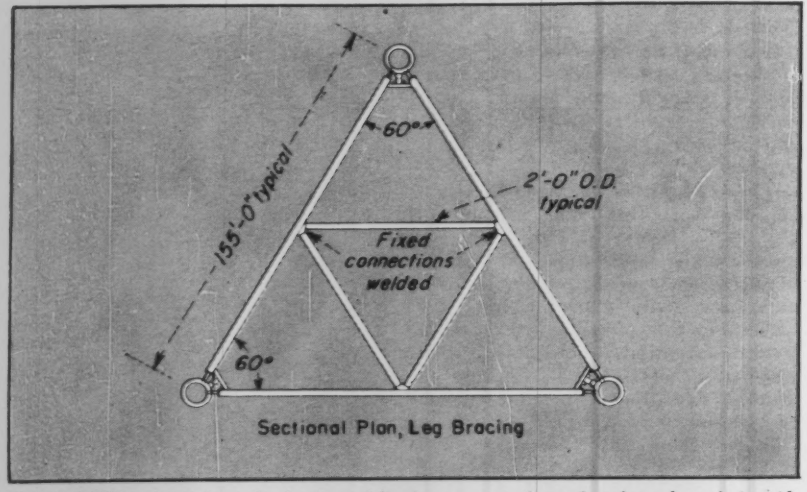
"Atomic power, developed and financed by the people, should be made available from federal nuclear plants as soon as production costs can be materially reduced," the report stated.

ENR's Index of Editorial Content for July-December 1960 is now ready to be mailed. The Index is free. To put your name on the Index mailing list, write: Indexing Department, ENGINEERING NEWS-RECORD, 330 West 42nd St., New York 36, N. Y.

Air Force Marks Tower Damage



LEGS of Texas Tower No. 4 were braced by trusses at four levels. They rested on sand 25 ft beneath the ocean bottom and were partially concreted.



PLAN VIEW shows how the horizontal leg braces were themselves braced at their midpoints. Braces were welded at the midpoints, pinned at the legs.

A decision to evacuate Texas Tower No. 4 had been made when it collapsed January 15, killing 28 men.

The decision came after an underwater inspection of the tower's legs had been made on January 6 by J. Rich Steers, Inc., the contractor that built the tower and was in the process of making repairs on it. The contractor's underwater inspection report showed that there were "deficiencies" in the underwater structure. The Air Force, however, has refused to release details of the report spelling out just what underwater damage was present.

A tight band of secrecy has been slapped on the whole incident by the Air Force, even though there is no issue of classified information or national security involved. People within the Air Force who have detailed information on the project have been ordered not to talk with the press. Air Force press officers handling information on it only give out the broadest general answers to requests for information.

There are several pertinent questions that are still unanswered.

For example, it is said that the original cause of the damage to the tower was Hurricane Donna in September of last year, but the nature and extent of the damage is still a closely guarded secret. Donna subjected the tower to forces much greater than any previous storm—one source says the anemometer on the tower registered a wind velocity of 100 mph before the peak of the storm and then stopped operating. Since the tower is said to have been designed to resist 125 mph winds (ENR Oct. 25, 1956, p. 40), the probable maximum wind velocity is a point of interest.

Another question is the reserve capacity in the tower to resist higher waves than those of 35 ft, for which it is said to have been designed. It was reported that there were 65-ft waves at the tower during the hurricane.

All that was revealed at the time was that there had been damage to the superstructure and the legs, and that some sway braces were loosened. One report, neither denied nor confirmed by the Air Force, is that corrosion had been noted in the legs even before the hurricane damage.

On Oct. 3, 1960, the Air Force let a repair contract to J. Rich Steers, Inc. and Moran, Proctor, Mueser & Rutledge, contractor and engineer when the Navy built the tower for the Air Force in 1956. The repair contract was for about $500,000 and called for completion work within 120 days. But the Air Force has not said just what per-

'Secret'

centage of the repair work had been completed by January 15 when the tower collapsed.

On November 15, following an underwater inspection of the tower, the Air Force reduced its 75-man operating force to only 14 persons. Announcement of this action was made on November 17 by the Air Force. The electronic equipment on the tower was put on a standby status. The Air Force says the 14 servicemen were left on the tower primarily to provide support facilities for the construction crews.

Some reports claim the tower was further damaged by storms in December, but there is some confusion on the issue and no official report by the Air Force on the matter.

On January 16, immediately following the tower's collapse, the Air Force appointed Major General James C. Jensen, commanding officer of the 30th Air Division at Madison, Wis., to head a board of inquiry into the matter. And, the Air Force ordered the remaining two Texas Towers off the coast of Massachusetts to be re-inspected.

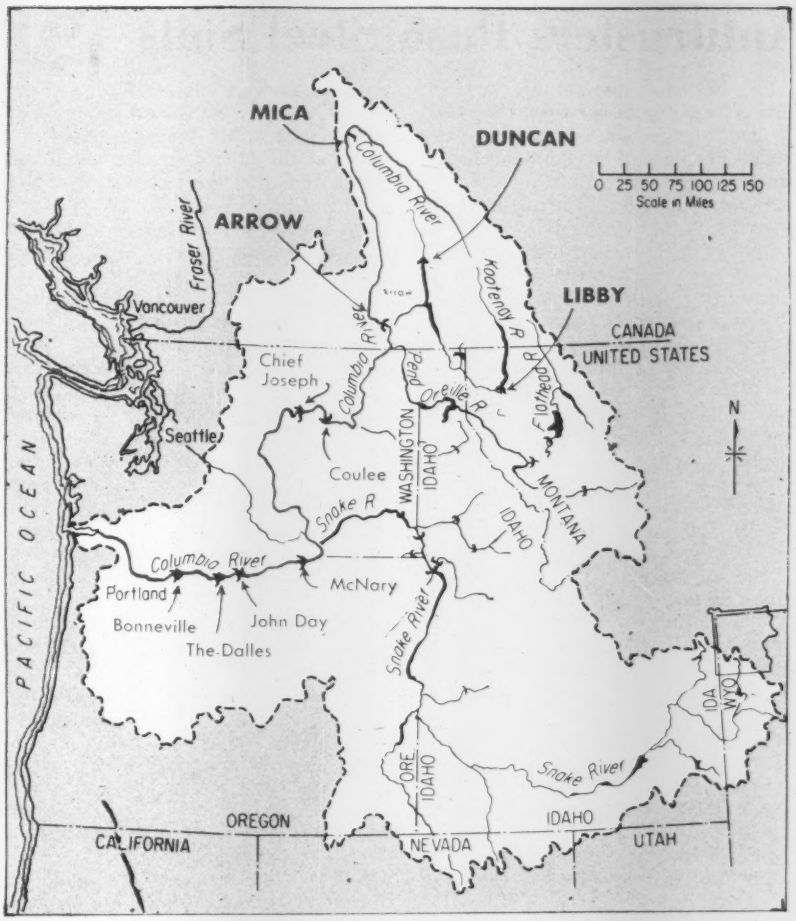
Tower No. 4 sat in 185 ft of water on a sandy ocean floor. The three legs supporting the tower's platform were about 288 ft long and jetted some 20 ft into the ocean floor. They were anchored there with concrete footings. The tower's platform was placed some 67 ft above the mean water level.

Texas Towers No. 2 and 3 are located closer to the coast than tower No. 4 and in shallower water, with the structures resting on bedrock.

Five such towers were originally planned by the Air Force to house big radar installations that fit into the air defense network. Tower No. 1 was originally to go off the coast of Maine, but the Air Force decided the facility was not needed and never built the structure.

Tower No. 2, the first to be completed, is located on Georges Bank in 56 ft of water about 160 miles southeast of Boston. Tower No. 3 sits in 80 ft of water, some 80 miles southeast of Nantucket. Tower No. 4 was about 70 miles east of Ambrose Light off of New York and the farthest to sea of the four towers. Tower No. 5 was to have been built about 200 miles east of Boston on Browns Bank in 130 ft of water, but it too, was scrapped by the Air Force before it was built.

The fateful Tower No. 4 had also been damaged by Hurricane Daisy back in September, 1958. Before the hurricane struck, however, all personnel had been evacuated from the tower. Damage from Daisy amounted to around $500,000.



FOUR NEW DAMS in the Columbia Basin in next 10 years are called for.

Columbia Treaty Goes to Senate

The Columbia River joint development treaty went to the U.S. Senate and the Canadian Parliament last week for ratification. The treaty has virtually the same terms recommended by negotiators last October (ENR Oct. 27, 1960, p. 21).

The main points:

- Canada will build storage dams on the Columbia main stem at Arrow Lake and Mica Creek, and on one or more tributaries of the Kootenay River near Duncan Lake.
- The U.S. will take full advantage of the Canadian storage to increase hydro generation downstream and will return half the power benefit to Canada.
- The U.S. has an option to build Libby Dam on the Kootenai River in Montana. Canada will acquire and clear land at her expense for the part of the reservoir lying in Canada.
- Canada will provide flood-control capacity at the upstream dams in return for cash payments totaling about $65 million.
- No diversions that would affect Columbia discharge across the border will be permitted during the 60-year minimum life of the treaty.

The agreement is expected to generate nearly a billion dollars worth of construction during the next 10 years. Major construction costs estimates: High Arrow, $71.8 million; Mica, $247.2 million; Duncan, $25.6 million; Libby, $322.9 million; generating and transmission capacity, $180 million.

The U. S. must start construction on Libby within five years of ratification or forfeit the option. Canada must begin full storage at Arrow and Duncan within five years and at Mica within nine years or give up certain amounts of flood control payments for each month of delay.

The pact calls for establishment of a permanent four-man engineering board made up of two appointees from each country.

The agreement is the result of 15 years of study by the International Joint Commission and its International Columbia River Engineering Board.

Antitrusters Push Steel Suits

The antitrust division of the U.S. Justice Department last week continued its campaign against marketing and pricing practices of steel producers and structural steel fabricators.

In San Francisco, 11 structural steel fabricators and one trade association composed of fabricators signed consent decrees in U.S. District Court. The companies and their association, along with five producers, were indicted in November 1959 on charges of conspiring to eliminate competition in the sale, distribution and fabrication of reinforcing bars in Arizona, California, Idaho, Nevada, Oregon, Utah and Washington (ENR Nov. 26, 1959, p. 26).

While accepting the consent decrees from the fabricators and the association, Lyle L. Jones, who is the Justice Department attorney, said the government will take its case against the producers into court.

In St. Louis, meanwhile, the Justice Department is building a case against three large steel manufacturers suspected of collusion in bidding for steel contracts with the Missouri State Highway Commission. The antitrusters recently obtained federal grand jury indictments against seven steel fabricators on charges of bid-rigging and market-allocating (ENR Jan. 12, p. 15).

Fabricators and the association that signed consent decrees in San Francisco are: Ceco Steel Products Corp., Chicago; Gilmore-Skoubye Steel Contractors, Oakland; Herrick Iron Works, Hayward, Calif.; F. A. Klinger, Inc., Stockton, Calif.; Meehleis Steel Co., Vernon, Calif.; Pittsburgh-Des Moines Steel Co., Pittsburgh; Rutherford & Skoubye, Inc., Los Angeles; Joseph T. Ryerson & Son, Inc., Chicago; San Jose Co., Inc., San Jose, Calif.; Soule Steel Co., San Francisco; Southwest Steel Rolling Mills, Los Angeles; and Western Reinforcing Steel Fabricators Association, Oakland.

The Blue Diamond Corp. of Los Angeles was also indicted, but because it was bought by Flintkote Co. of New York City after the investigations had already started, Mr. Jones requested dismissal of the suit. The presence of the Flintkote Co. in the case was described as "incidental."

The producers in the West Coast case are: Judson Steel Corp., Emeryville, Calif.; Pacific States Steel Corp., Niles, Calif.; Southwest Steel Rolling Mills, Los Angeles; United States Steel Corp., Pittsburgh; Pacific Coast Steel Corp., San Francisco; and Bethlehem Steel Co., San Francisco. The last two companies are divisions of Bethlehem Steel Corp., Bethlehem, Pa.

The consent judgments against the fabricators enjoin them from agreeing to allocate or divide fabrication jobs among fabricators, from fixing uniform interest rates and from agreeing to buy or refrain from buying reinforcing bars made in foreign countries.

The St. Louis indictment against seven fabricators charges that they agreed to split Missouri into an eastern and a western "territory," raising or lowering bids so that the favored companies would win contracts in their allotted areas. Companies are: Stupp Bros. Bridge & Iron Co., Wilmar Steel Products Co., both of St. Louis; St. Joseph Structural Steel Co., St. Joseph, Mo.; Kansas City Structural Steel Co., Kansas City, Mo.; Missouri Valley Steel, Inc., Leavenworth, Kan.; A. J. Industries, Inc., Los Angeles; and Havens Structural Steel Co., Kansas City, Mo.

The Missouri State Highway Commission bought about $21 million worth of steel from the defendants from 1954 to 1959, according to the Justice Department. Both state and federal funds were used in making the purchases of the steel.

Although the U.S. Attorney in St. Louis will not identify the steel producers investigated, he has submitted a confidential report to Earl Jinkinson, head of the department's antitrust division in Chicago.

Steel School at $14.86 Per Sq Ft

An all-steel school for 1,600 pupils is going up in Elmira, N. Y., at a $174,000 saving under estimate—despite a 7,962-sq-ft increase in its area.

The 55-room elementary-junior high school has a 1,000-seat auditorium, a cafeteria and two gymnasiums. Its 1,000 tons of steel—frame, walls and partitions—will all go up in about nine months.

Its factory-assembled exterior wall panels are 4 x 11 ft, porcelain enameled, and they contain the building's sash. Inside surfaces are mill-applied vinyl.

The project cost of $14.86 per sq ft will be nearly $1.00 per sq ft below the designer's estimate of $15.85; and $2 to $3 per sq ft under the New York statewide average of $17 to $18 for school construction. Total cost of the building is estimated at $2.2 million.

Considine and Haskell are the architects. Streeter Associates, Inc., is the general contractor. Walter Clancy is the structural engineer. All are from Elmira. The American Bridge Division of United States Steel Corp. developed the modular system.

Chilling Prospect

Utility will sell water for air conditioning

Hartford Gas Co. will build a refrigerating plant and distribution system for chilled water for air conditioning buildings in a downtown section of Hartford, Conn. The water will be sold to individual owners or tenants.

Central air conditioning has been installed previously for several buildings in one project, but this probably is the first installation for serving a large area containing unrelated buildings.

Initially, the proposed system will serve an area one-half mile long by one-quarter mile wide. It will take in Constitution Plaza, an urban redevelopment project sponsored by Travelers Insurance Co.

Present plans call for an initial installation of two 1,500-ton and one 3,000-ton steam-driven centrifugal compressors and one 500-ton absorption machine—all supplied by Carrier Corp. In addition, gas and oil-fired boilers with 150,000 lb of steam-generating capacity will be provided. This equipment is estimated to be capable of air conditioning 2,190,000 sq ft of floor area. Cost of plant and distribution system will be $3 million.

If demand warrants, another 150,000 lb of steam-generating capacity and 5,000 tons of refrigeration will be added in the future.

The initial installation will supply 13,000 gpm of chilled water at 40F. Water temperature is expected to rise only about one degree from the plant to the farthest building being supplied. Used water will be recirculated.

Insulated pipes range in diameter from 24 in. down to 16 in. About three miles in all will be installed under the city streets.

Most buildings tapping the system will be charged in accordance with number of Btu's used, as registered on supply and exhaust water meters.

The gas company hopes the project will lead to evening out of the year 'round demand for gas. Boilers will be oil fired only in winter, when gas demand is heavy.

Advantages to building owners include elimination of machine operators (the central plant may need six to eight men, compared with the 30 to 50 that would be required in toto if individual buildings were equipped with their own machines), no equipment maintenance, and saving in space. However, owners will have to install air-handling equipment, as usual.

The project is expected to be completed by the spring of 1962. Seelye, Stevenson, Value & Knecht of New York City are the consulting engineers.

"If I were a small contractor I'd have one of them myself"

EARL BOWERS • **Grade Foreman**
Benzie County, Michigan

After one year's experience with a John Deere "840" Diesel and elevating scraper, Michigan's Benzie County Road Commission decided to buy another, trading in a veteran crawler and pan outfit.

Grade Foreman Earl Bowers reported, "The John Deere was the best value for road work in our local sand and clay conditions. I didn't want a machine that wasn't going to load itself. We have had good service from our dealer on the first unit, and it's been cheap to operate. If I were a small contractor, I'd have one of them myself."

Combining self-loading with fast hydraulic ejection, the John Deere "840" with elevating scraper operates efficiently in conditions ranging from blow sand to heavy clays. High maneuverability speeds construction of shoulders and city streets, cuts cycle time on open highway work as well.

Your John Deere dealer will be glad to demonstrate and give you the information you need on this tractor-scraper combination. Contact him now through the classified telephone directory. Watch for big news on John Deere Wheel Tractors.

JOHN DEERE BULLDOZERS · LOADERS · BACKHOES AND EARTHMOVING EQUIPMENT

JOHN DEERE

New York Acts to Save Statewide Building Code

A bill introduced in the New York State Assembly and Senate will extend indefinitely the life of the state building code. Without an extension at this session of the legislature, the code would be abolished.

The bill will retain the code under the jurisdiction of the State Housing Division permanently. This part of the measure is controversial, since many New York architects, engineers and contractors would prefer administration by a separate agency or the Office of Local Government.

Chances of a separate agency being established are poor in view of the trend under Gov. Nelson A. Rockefeller toward simplification of the state government by combining agencies. And a shift of the code to another government department is unlikely because it has been under the aegis of the Housing Division for about two years.

The new bill will establish a seven-man council to assist the housing commissioner. At least one of the council's members would be a professional engineer and one a registered architect. Three of the members would form a Board of Review.

Frederick Zurmuhlen Dies: N. Y. Public Works Chief

Frederick H. Zurmuhlen, who, in his 13 years as Commissioner of New York City's Department of Public Works, contracted for $675 million worth of construction, died last week at the age of 63.

Mr. Zurmuhlen held the city's top public works post longer than anyone before him, serving in the appointive post under three different mayors. A $300-million pollution control program and a $150-million hospital program were chief among his responsibilities.

Mr. Zurmuhlen brought to his public works job experience in both consulting and contracting. His experience included a score of years as a consulting engineer and architect, a period as assistant state engineer of the Department of Public Works, two years with the Reconstruction Finance Agency, three years as chief engineer of a Walsh Construction Co.-George F. Driscoll Co., combine on a Trinidad Army base, and three more years as chief engineer of George F. Driscoll Co.

Mr. Zurmuhlen was a professional engineer, a registered architect and a land surveyor, and a stickler for professional registration among the roughly 600 professionals in his department. He served as president of the New York State Society of Professional Engineers and as a vice president of the National Society of Professional engineers.

Around the World . . .

• **Washbourne resigns**—Lee B. Washbourne, Oklahoma director of highways since July, 1959, has resigned; as predicted, as a result of pressure from the state legislature (ENR Jan. 19, p. 15). No replacement has been named. Mr. Washbourne will join Midland Engineering Co. as supervising engineer.

• **Try anything once**—The Russians' Plastics Research Institute has come up with a new recipe for concrete: Use cotton bolls run through a hydrolysis process instead of cement. They claim compressive, tensile and bending strengths far in excess of regular concrete. And reinforcing it with bamboo or glass fiber makes it really special, they say.

• **Lost and found**—Delaware Attorney General Januar D. Bove apparently is backing water on one segment of his attack on the state highway department (ENR Jan. 5, p. 26). Accountants now say Delaware has lost no federal-aid highway funds. Wholesale reform of department regulations resulted from the report; and two state senators have been bumped from the highway department payroll.

• **Compact villain**—Kentucky officials say compact cars are cutting the income of the state's road fund. Income was 1.7% below estimates in the July-December period, the first half of the 1960-61 fiscal year. The drop occurred despite additional income from a new 3% sales tax on cars.

• **Self-improvement**—An organization in Oklahoma will strive for higher standards on the design and construction of public works installations. The new group, the Oklahoma Public Works Council, was founded by the Consulting Engineers Association of Oklahoma, the Oklahoma Municipal Contractors Association and the Oklahoma Municipal League.

• **Medical facilities contest**—A $25,000 competition open only to U.S. architects has as its objective stimulation of long-range planning for the medical-care facilities in the community. For more information, write Mastic Tile Division, The Ruberoid Co., 500 Fifth Ave., New York 36, N. Y.

• **Atomic power**—The Bechtel Corp. will design and build a $28-million nuclear power plant at Big Rock Point, Mich. Consumers Power Co. of Jackson, Mich., and the General Electric Co., which will conduct a research and development program, will get federal subsidies through the Atomic Energy Commission for part of the construction and operating costs.

• **Steel work starts at Paradise**—Steel erection has begun on a powerhouse for the biggest generators in the world—two 650,000-kw units for TVA's $180-million plant in Paradise, Ky. The powerhouse structure will be the equivalent of 20 stories high. It will require 200,000 tons of structural steel. The first generator will go on the line in 1962.

• **GM looks West**—Construction will start during 1961 on a 400-acre General Motors plant in Fremont, Calif. The plant will manufacture Chevrolet cars and trucks.

• **Tollroad for Arizona?**—Earle V. Miller, Phoenix consulting engineer, is plugging creation of an Arizona Turnpike Authority to build and operate a $70-million, 109-mile tollroad between Phoenix and Brenda. The route follows the proposed location of Interstate 10, which is bitterly opposed by all the communities it bypasses. Toll financing might free federal funds earmarked for the project for use on other Interstate routes.

• **Making space count**—The "air space" program of the Toronto Transit Commission will get its first use if the commission approves a proposal to build a $5-million office tower above the Eglinton-Yonge subway station. In addition to 250,000 sq ft of commercial space, the 12-story building would contain parking facilities for 450 cars.

• **Underground schools**—A $425,000 elementary school plus a five-room addition to an existing school in Artesia, N. M., will be built underground, serving as prototypes for design of school-shelters that might be built elsewhere.

• **From Maine to California**—Keyes Fibre Co., Waterville, Me., plans construction of an $8-million plant at Sacramento, Calif.

2½-yard P&H shovel digs rock on uneven footing . . .

OUR MAGNETORQUE-EQUIPPED P&H

"takes a 3½-ton bite every 15 seconds"

...FLOYD L. SOMERS CO., Medford, Oregon

makes fast swing and dumps load into truck.

Harlan E. Weaver, Superintendent, reports . . ."*Moving rock like this is hard work, and our 2½-yard* P&H *crawler shovel has been doing it for the past 4 years. This machine has Magnetorque swing, which is the big reason we get a complete work cycle in 15 seconds . . . 40% faster than the shovel we used to use. This really adds up to top yardage at the end of the day.*"

Smoother, faster swings speed up operation. Floyd L. Somers has the contract to excavate, haul and supply the fill for the new bridge over the Siuslaw River near Florence, Oregon. Of prime importance to him is the speed with which he can excavate rock and load trucks for the haul to the dumping site. That's why Magnetorque is so important on his 2½-yard P&H shovel. It gives him faster, smoother swings with an average work cycle time of 15 seconds.

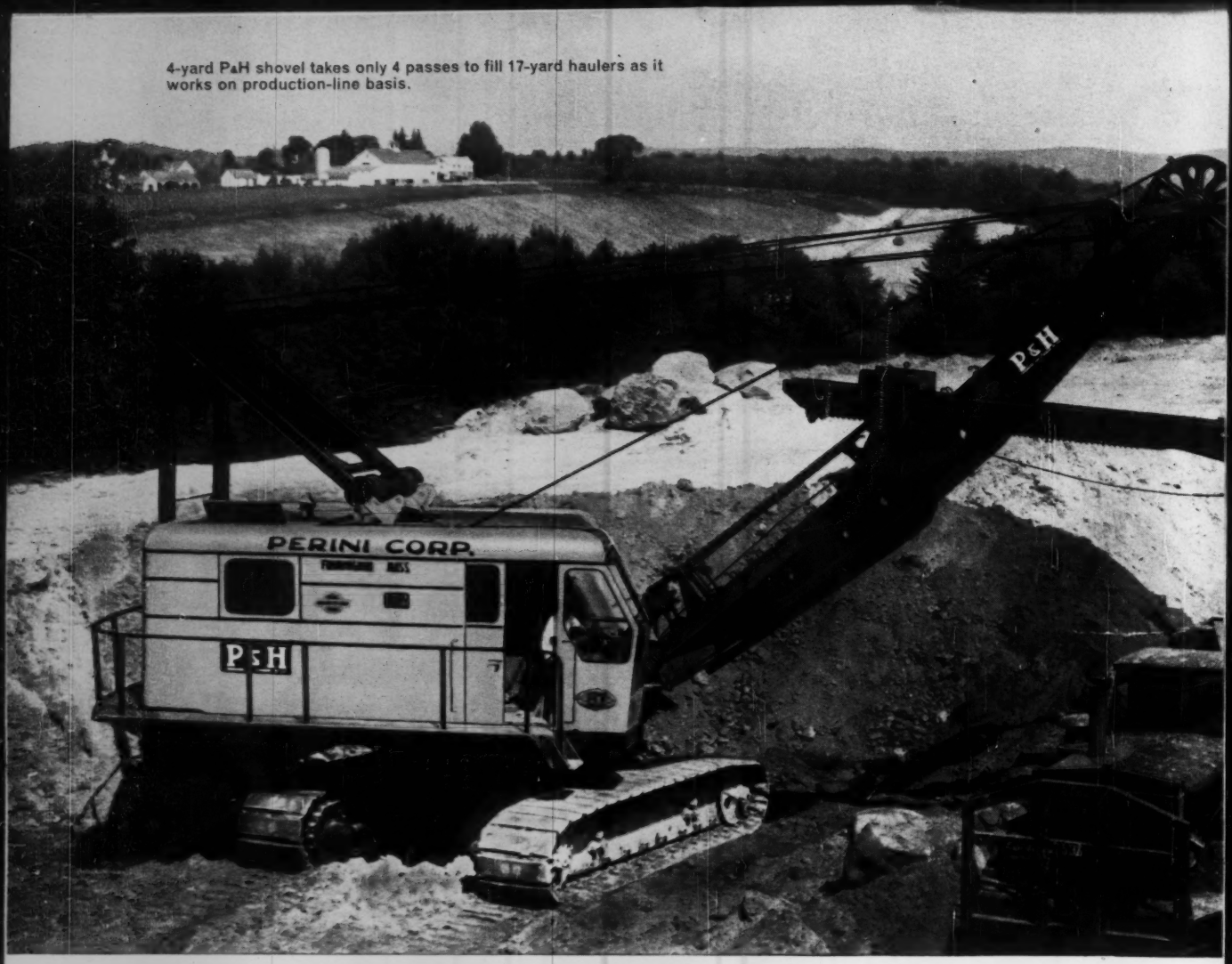
P&H shovel works on uneven ground. On this particular job, the P&H is forced to work on a 20-30% grade and swing while the tracks are on uneven footing, but even after operating under these conditions all day, there is no overheating of the Magnetorque swingers.

A. L. Mattson, Superintendent, says . . ."*This P&H shovel is one of the most modern and easiest to operate machines I have seen. Magnetorque, hydraulic controls and air/hydraulic brakes give our operators perfect control at all times—enable them to get maximum production with minimum effort on their part.*"

For complete information on this job, write for Case History 129 or call your local P&H dealer.

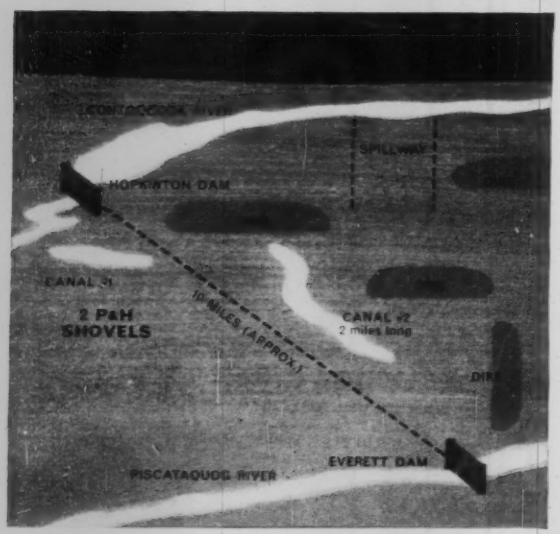
HARNISCHFEGER P&H
Milwaukee 46, Wisconsin

4-yard P&H shovel takes only 4 passes to fill 17-yard haulers as it works on production-line basis.



"We need top yardage...we chose

...PERINI CORPORATION, Framingham,

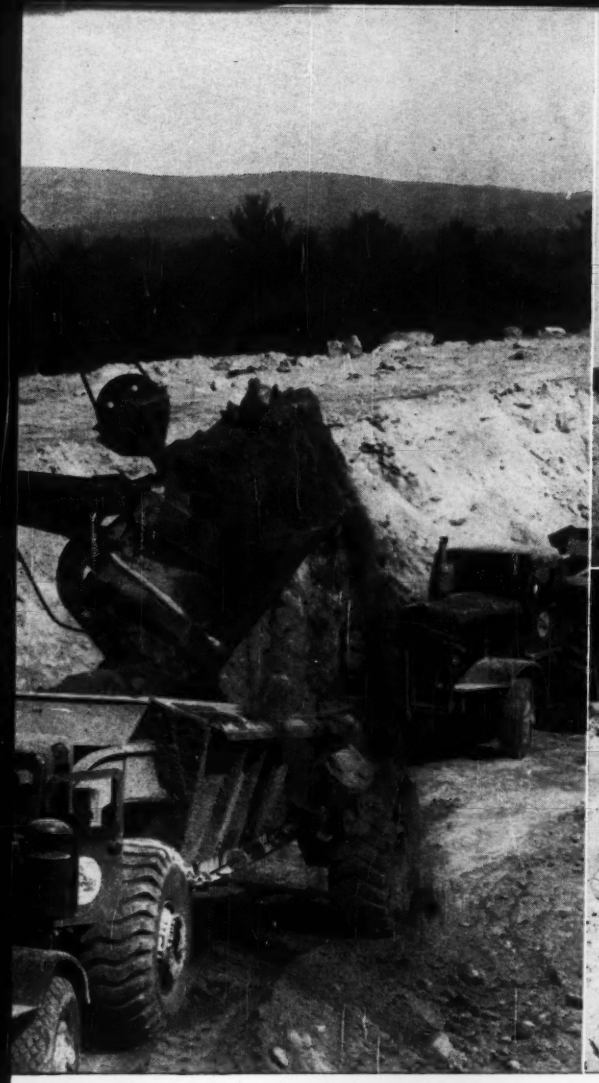


Drawing shows the overall construction area and details the nine separate phases of operation on this project.

Warren H. Pettengill, Project Manager, reports— *"Our two 4-yard P&H shovels give us faster, smoother work cycles . . . more yardage at the end of the day. This is important on a project that will take 3 years to complete, covers an area of 65 square miles and involves almost 7 million yards of rock, boulders, gravel and earth."*

2 P&H Shovels Team Up On Excavation— Keep Haul Units Hustling

Warren Pettengill used his two P&H shovels as a team to handle the excavation on Canal No. 1. He found that both 4-yard P&H shovels maintained a 20-second work cycle . . . and loaded out the 17-yard capacity haul units in 4 passes. Both P&H machines, equipped with Magnetorque Drive for swing and propel, gave him faster and smoother work cycles . . . more precisely controlled starting and stopping for spotting loads over trucks . . . permitted his operators to maintain 20-second work cycles all day long without tiring them out.



Magnetorque-equipped P&H shovel digs boulders and earth as it makes a complete work cycle every 20 seconds.

P&H rapid-reversing chain crowd provides faster shovel retract and ease of operation — means faster, more positive digging.

P&H works from a bench as it loads hauling unit on a lower grade.

Magnetorque-equipped P&H shovels"

Massachusetts, $8,000,000 Merrimac River Flood Control Project, Hopkinton, N. H.

Top Yardage, On-Schedule-Performance Key To Operation

This flood control project involves many phases of operation, each dependent on the other. Roads must be relocated. Excavated material from canals and spillway must be used as fill in the construction of dikes and dams. A slowdown of yardage or a machine breakdown would seriously hamper coordinated scheduling and construction. Perini's P&H rigs have the built-in ruggedness and durability to stay on the job month after month with minimum downtime for servicing.

P&H Shovels Maneuver Well In Mud

Excavation has been carried out in soft, wet ground that has mired other equipment. The two P&H shovels with single roller crawler assemblies and 36" wide crawler shoes have been able to maneuver without trouble and travel rapidly from one location to another. This is extremely important on this project where continuous production is vital to the overall operation.

For more information on this job, write for Case History Report 130 . . . to the world's largest manufacturer of power cranes and shovels—

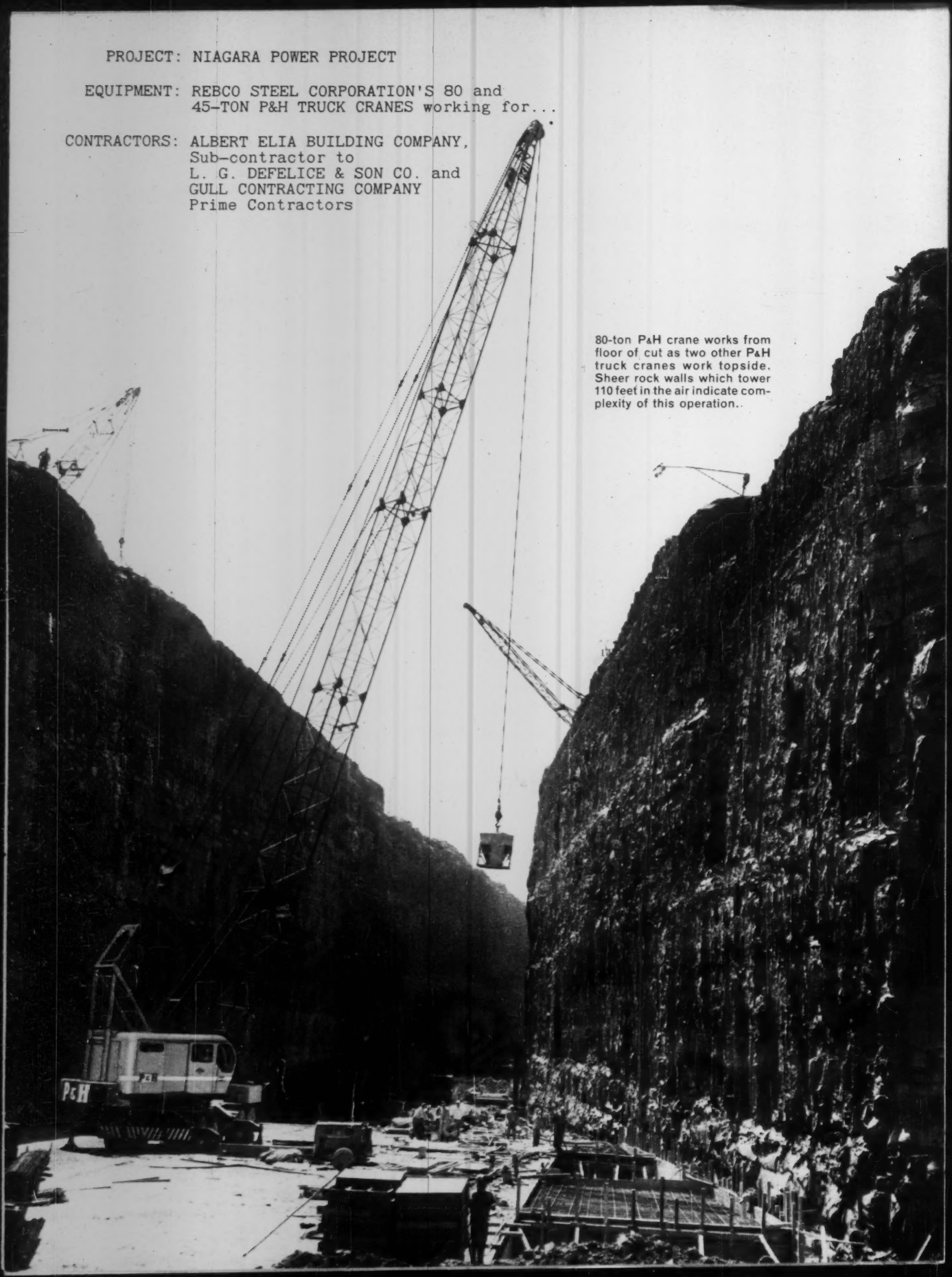
HARNISCHFEGER P&H
CONSTRUCTION & MINING DIVISION
Milwaukee 46, Wisconsin

AS YOU PLAN FOR 1961, PLAN ON MAGNETORQUE . . . AND CHOOSE THE RIGHT MACHINE FOR YOUR WORK FROM 40 DIFFERENT MODELS . . . THERE'S A P&H FOR EVERY JOB! . . . WRITE FOR "THE FABULOUS 40"

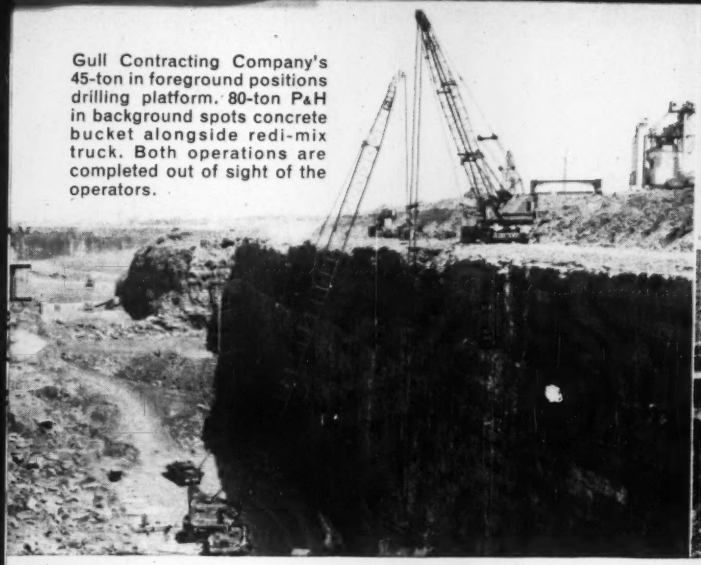
PROJECT: NIAGARA POWER PROJECT

EQUIPMENT: REBCO STEEL CORPORATION'S 80 and 45-TON P&H TRUCK CRANES working for...

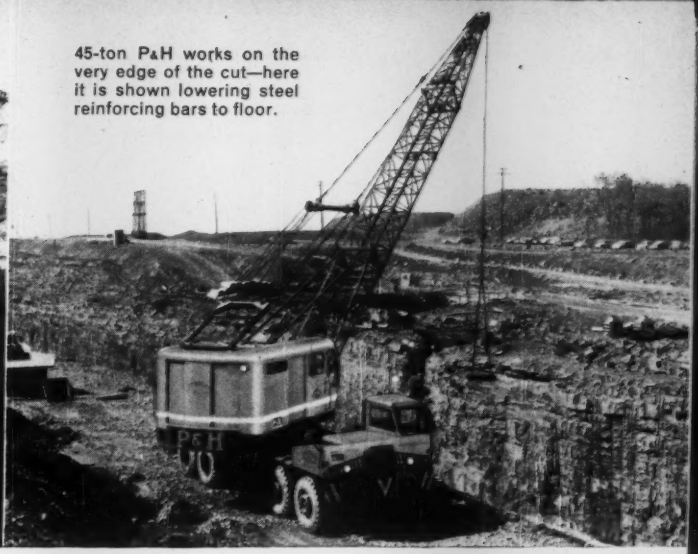
CONTRACTORS: ALBERT ELIA BUILDING COMPANY, Sub-contractor to L. G. DEFELICE & SON CO. and GULL CONTRACTING COMPANY Prime Contractors



80-ton P&H crane works from floor of cut as two other P&H truck cranes work topside. Sheer rock walls which tower 110 feet in the air indicate complexity of this operation..



Gull Contracting Company's 45-ton in foreground positions drilling platform. 80-ton P&H in background spots concrete bucket alongside redi-mix truck. Both operations are completed out of sight of the operators.



45-ton P&H works on the very edge of the cut—here it is shown lowering steel reinforcing bars to floor.

Magnetorque is Key to Vital Operation as

3 P&H cranes help harness the mighty Niagara

Joe VeRost, Rebco Steel Corporation's Vice President reports—*"The unusual conditions here at Niagara forced Albert Elia to operate the 80-ton P&H from the floor of the 110-foot deep cut . . . picking up concrete from a point on top of the cut, out of sight of the operator . . . swinging it out and over and lowering it to the bottom for the pour. In my opinion this could not have been done without Magnetorque swing drive."*

80-ton P&H "Feels in the Dark"

Sitting at the bottom of the cut and swinging 160 feet of boom, Rebco's 80-ton P&H truck crane reached up and over the 110 foot wall to pick up loaded 2-yard concrete buckets that were out of sight. It swung them smoothly and easily up and over the lip and lowered them to the floor, where it poured concrete in flat forms. This "out-of-sight" operation was controlled and directed by telephones between the operator and the concrete foreman. Pin-point positioning with 160 feet of boom—no simple task in itself—was made even more critical by the need to work this long boom "within inches" of the wall. It calls for extreme skill and smooth, immediate-action controls.

Mike Comerford, operator, praises Magnetorque—"Without Magnetorque controlled swing it would have been almost impossible to handle this job. With friction clutches, the boom whip would have been too violent—it would not have been possible to swing a few inches at a time. We have been making complete cycles in 2 minutes including pouring which required walking the bucket. To top it off we had to make 180 degree swings."

45-ton P&H works topside—fishes deep

Rebco's 45-ton P&H truck crane, sitting on the very edge of the 110 foot cut, constantly lowered reinforcing steel, equipment and concrete to the floor below. Operator Tom Wagner was also forced to operate "in the dark," receiving directions and instructions by phone. Tom Wagner says—"Smooth operation and accurate positioning of loads were possible with the immediate-action hydraulic control system of the P&H. It gave me more immediate control—and that's what we needed on this job."

45-ton P&H truck crane positions drilling rig

A 45-ton P&H, belonging to Gull Contracting Company, operated from the top of the cut where it supports a movable drilling platform some sixty feet down the side of the sheer wall. "Triple-safe" Planetary Boom Hoist assured positive holding of the platform as holes were drilled in the side of the rock wall for steel reinforcing bars. The P&H lowered or raised the platform to new positions as soon as the holes were drilled.

P&H gives unmatched performance

Rushing for completion of this huge project, contractors are putting men and equipment to extreme tests. Operating a two-shift program of ten hours each, the P&H truck cranes are used constantly, twenty hours out of the twenty four . . . six days out of the week. Under extreme endurance tests like this, P&H durability and ruggedness stand out . . . actually deliver more working time on the job.

For complete information on this job, write for Case History 121 . . . to the world's largest manufacturer of power cranes and shovels—

HARNISCHFEGER P&H
CONSTRUCTION & MINING DIVISION
Milwaukee 46, Wisconsin

AS YOU PLAN FOR 1961, PLAN ON MAGNETORQUE . . . AND CHOOSE THE RIGHT MACHINE FOR YOUR WORK
FROM 40 DIFFERENT MODELS . . . THERE'S A P&H FOR EVERY JOB! . . . WRITE FOR "THE FABULOUS 40"

Fast, accurate swings to work areas, often more than 170 feet away, were possible with exclusive Magnetorque drive.

"Long reach with Magnetorque swing makes the difference ...it's the key to efficient operation"

. . . J. L. SIMMONS COMPANY INC., CONTRACTORS—NORTH SIDE SEWAGE TREATMENT WORKS OF GREATER CHICAGO

One of the nation's oldest contractors reports on his 110-ton P&H Crawler Crane operation.

Here's what F. A. Miller, Construction Manager has to say . . . *"Without a doubt, our 110-ton P&H Crane has been the key to this operation. Its lived up to our every expectation. For example—we've poured concrete over 170 feet away with a 200 foot boom and a 1-yard bucket . . . over 150 feet away with a 2-yard bucket. Its got the fastest, controlled swings of any crane I've seen. We're ahead of schedule and our work is proceeding smoothly, efficiently as planned . . . thanks to our P&H."*

Long Reach—the ability to handle up to 300 feet of boom permitted J. L. Simmons Company to work from the perimeter of the job and spot light loads anywhere . . . resulted in faster, more economical construction, more efficient operation.

Fast, Effortless Swings—with exclusive Magnetorque® drive. The big crane gave Simmons more work loads per hour and smoother, more accurate starting and stopping . . . Highly important in this operation where long, safe swings were a necessity.

Big Capacity—with a rating of 110 tons, the P&H had more than enough capacity to handle the big work loads of concrete and equipment at those far-

Long reach of the 110-ton P&H permitted efficient work procedure. Here the crane loads concrete bucket from mixer truck on job perimeter before delivery to work area.

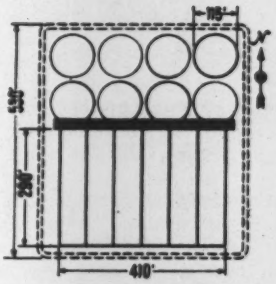
Precise spotting of work loads was a cinch due to P&H planetary boom hoist, unmatched stability and positive-action hydraulic controls.

out reaches . . . enabled Simmons to maintain top production and uninterrupted work flow.

Accurate Spotting of Loads—precise accuracy in spotting loads at far-out reaches was a problem on this job—and was solved through Independent Planetary Boom Hoist, which permitted power lowering of the boom, together with the simple Hydraulic Control System—where the slightest lever or pedal movement produced immediate response—resulted in smoother work cycles with no lost time jockeying for position.

Unmatched Stability—the ability to handle up to 300 feet of boom and the rated loads with utmost accuracy and safety were the result of P&H balanced design, even weight distribution and the extra wide 16′ 10″ crawler assembly. It was this built-in stability that permitted those long reaches with full capacity loads.

For the full detailed report on this unusual job story, write for Case History Report No. 102 . . . to the world's largest manufacturer of power cranes and shovels.



● 8 circular, final settling tanks, each 115′ in diameter.

☐ Overhead gallery separates aeration and settling tanks.

☐ Adjoining aeration tanks form huge rectangle 290′ x 410′.

=== work path of P&H crawler crane

Overall job layout and type of unit construction indicates importance of perimeter work operation.

HARNISCHFEGER P&H

Milwaukee 46, Wisconsin

AS YOU PLAN FOR 1961, PLAN ON MAGNETORQUE . . . AND CHOOSE THE RIGHT MACHINE FOR YOUR WORK FROM 40 DIFFERENT MODELS . . . THERE'S A P&H FOR EVERY JOB! . . . WRITE FOR "THE FABULOUS 40"

Magnetorque-equipped P&H Shovels

MOVE A MOUNTAIN IN 8 HOURS

Two 3½-Yd. P&H Crawler Shovels Move 8,832 Tons of Rock In One Work-Day

for **Heintz-Rogers Construction Company,** Portland, Ore. on a Railroad Relocation Project, Snake River, Wash.

Above: 3½-yard P&H crawler shovel loads 276 trucks (16-ton) in an 8 hour shift.

Below: Fast swings, accurate controls makes it easy to sort out big rocks for rip-rap.

R. A. Heintz, president of R. A. Heintz Construction Co. and sponsor for above job reports: "We've used our two 3½-yard P&H Crawler Shovels extensively on this job—they've saved us about 25% in rock handling and drilling . . . and account for such daily tonnage records as 8,832 tons of blasted rock in 8 hours. Our larger capacity P&H shovels not only give us greater production but, because they handle larger sized rock, reduce our drilling costs—bringing down the over-all cost and earning us a bigger monthly estimate. We're seriously considering buying more and bigger P&H equipment—we're more than pleased with its performance."

This project involves the removal and redistribution of 5 million cubic yards of material along a 12 mile stretch of the Snake River. Construction of the Ice Harbor Dam will raise the water level of the river 40 feet, requiring relocation of the present railroad tracks to higher ground.

RUGGED, DEPENDABLE IN HEAVY ROCK—"*Working in heavy rock is hard on equipment and hard on a production schedule. With* P&H *rigs, I've noticed we get faster swing cycles and faster loading with no overheating of the swing clutches.*" So reports Russ Stroud, who has been operating construction equipment for over 24 years. He says—"*Magnetorque swing drive is faster, smoother with no jerking. Doesn't need maintenance and doesn't wear me out.*"

SMOOTH PERFORMANCE, TOP PRODUCTION—The exceptional performance of the two P&H machines has enabled Heintz-Rogers Construction Company to maintain top tonnage performance. Fast, smooth swings, accurate control of the work load and more time on the job has helped speed up work cycles and production. More proof why ONE P&H ALWAYS SELLS ANOTHER.

For the detailed story on this job, write for Case History Report No. 111 . . . to the world's largest manufacturer of power cranes and shovels—

HARNISCHFEGER P&H

Milwaukee 46, Wisconsin

Tell All in Informing Bidders

By Hubert S. Hunter

On a recent construction job for the California Division of Architecture the contractor collected a substantial extra payment because certain subsurface conditions had not been disclosed to him. As a result, the Division has made an exhaustive investigation of the legal responsibilities involved in such cases.

What we learned should interest those engaged in preparation of similar specifications.

This particular job involved the excavation of large quantities of soil, fractured rock, and hard rock. A paragraph in the specs relating to subsurface conditions stated:

> "Test pits have been dug in the designated locations and are open for the bidders to examine subsurface conditions found to exist where dug. The material from the test pits has been laid out as removed adjacent to each pit. The excavated material from the test pits is predominately fractured red rock."

Despite this description of conditions, controversy arose.

As we restudied the case, here is what we found:

Prior to advertising the project for bidding, six test pits were excavated to ascertain the hardness of the subsurface rock. This rock showed on the surface in a half-dozen places as hard, green serpentine rock. It was evident to the structural engineer that provision would have to be made in the contract for blasting.

Two additional pits were dug in the area where hard rock was suspected. One of these holes went down 9 ft to a solid rock ledge. A second hole was located 100 to 200 ft distant from the first. It went down 12 ft to final grade and none of the green rock ledge was encountered.

In the seven or eight test pits dug, dense, hard bedrock was observed only in one pit, in a corner of the project.

All the test pits were taken down to final grade and were utilized for bidding purposes. Ladders were constructed into the pits, and the material removed from the several pits was laid out in the order removed for inspection by the bidders.

However, just before the project went to bid—and it is important to note that the project concerned site grading only at this time—it became evident to the structural engineer that borings should be made in addition to the pits. Purpose was to determine soil conditions at the elevation of the future final grades. Accordingly, some 60 test borings were made before the date on which bids were taken.

Some of these borings showed hard rock in other areas besides the original corner of the project. The information derived from the test borings was received in the Division of Architecture only two days before the grading project was advertised for bids.

It was apparent to the Division of Architecture that a reasonable bidder would know, or should know, from a physical examination of the site, the test pits and the surrounding area, that hard rock would be encountered.

However, it is a fact that additional data developed from the sixty test borings were not made available to the bidders during the bidding period.

As a consequence, the grading contractor filed a claim against the Division of Architecture for additional compensation.

The law in California on the risk and liability of encountering unknown subsurface conditions has not been clearly defined.

In reviewing the law throughout the nation, it appears that nearly all states recognize, as an initial proposition, that the risk of encountering subsurface conditions is assumed by the contractor, especially if the contract expressly places this risk upon him.

However, the courts are not sympathetic with imposing such a blind risk upon the contractor and often seize upon other principles in deciding cases.

Another exception to this general principle is where the court finds that the plans and specifications in effect constitute a misrepresentation as to the nature of subsurface conditions. This involves a court determination as to whether the test pits and boring information—and perhaps other provisions of the plans and specifications—fall within the category of "representation" or "suggestion" as to subsurface conditions.

Of great importance in the preparation of contract documents is an additional requirement that the public agency make a full disclosure to the bidders of all information that it possesses as to subsurface conditions.

The attorneys for the Division of Architecture have not discovered a single jurisdiction that does not recognize this requirement of full disclosure.

One case brought to light in our research concerned a U. S. court and a dredging company. In this case the plans and specifications indicated that test borings had been made in the area to be dredged and that the results of borings could be seen by all bidders on maps on file with the government. The borings indicated only the presence of fine sand and mud. The contract stated that the government did not guarantee the correctness of these borings as representing the true character of the river bottom.

The U. S. Supreme Court held that the map on file for examination by bidders did not disclose the making of other borings, which had indicated the existence of material more difficult to remove than mere sand and mud. The resulting deception, even though not founded on bad faith, entitled the contractor, on discovery thereof, to abandon the work and recover at least the cost of removing the material actually excavated up to the time of abandonment.

We believe there is one cardinal rule for those who are charged with the preparation of plans and specifications and for obtaining test data preparatory to the making of such plans and specifications.

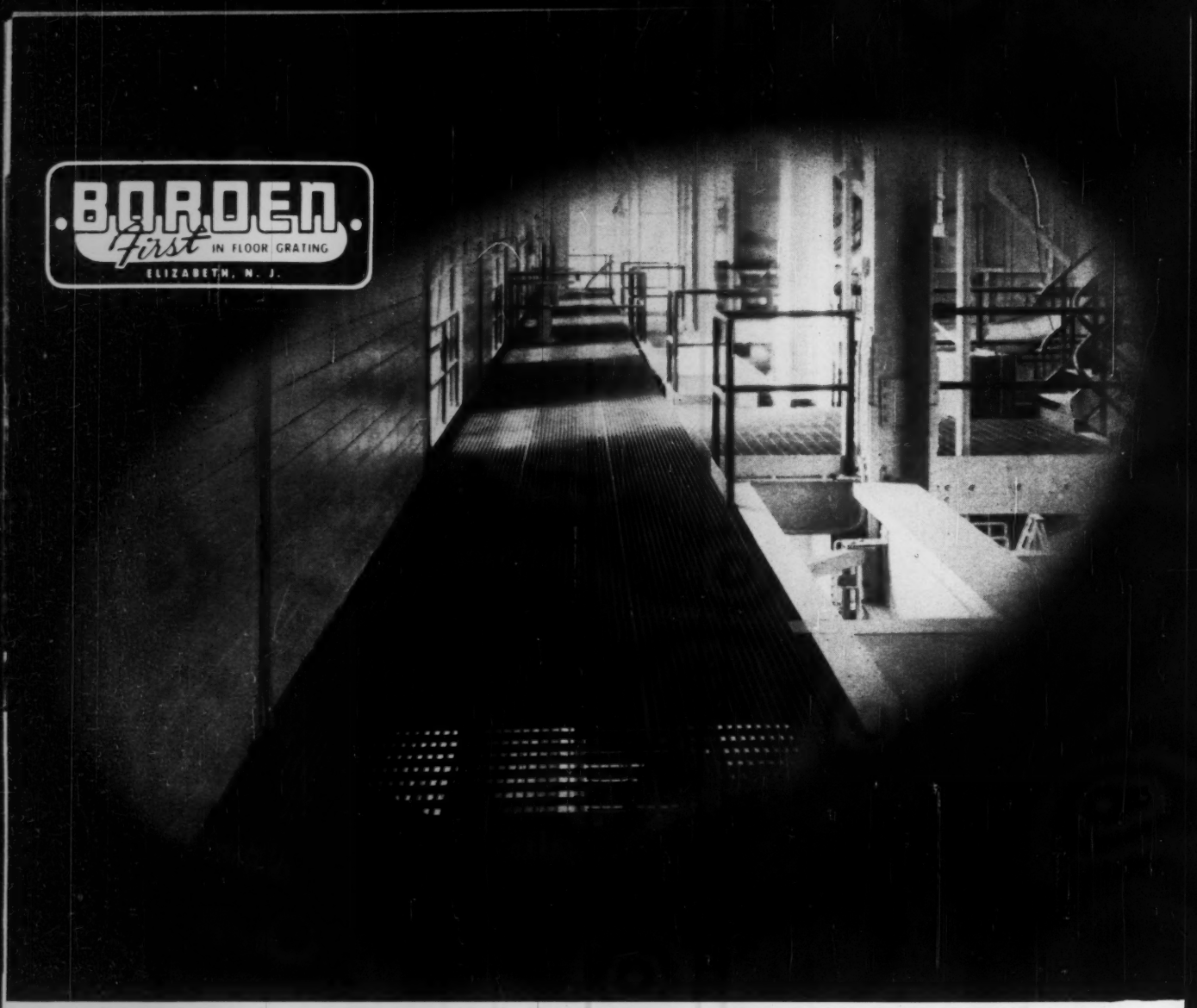
This is the rule:

It is essential for the architect or engineer, to the best of his ability, to determine through borings, test pits, or other means, as nearly as possible the character of the subsurface conditions and to make a full revelation of these conditions in the contract documents. In addition, it is important that any previous data, if known to the owner or his architect—even obtained several years before—must also be included with the information for bidders.

Knowledge of subsurface conditions is required by the architect for design purposes and estimates of cost, as well as by the contractor for bidding purposes. For this reason, the usually small additional cost of test borings is well justified.

Test-boring data on the drawings—with responsibility for their interpretation, actually specified to be the contractor's—will do much to eliminate liability on the part of the architect and owner for subsurface conditions encountered.

Hubert S. Hunter is deputy chief of the California Division of Architecture. This agency designs and supervises construction of California state buildings, valued at some $100 million annually.



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'61 Task: Volume with Profit

DOLLAR VOLUME OF NEW CONSTRUCTION, in contract awards, was never higher than in 1960. Yet '61 will see another 2% increase. And '62 should be 7% higher than '61. That's ENR's forecast in this report.

While the U.S. economy as a whole is expected to take until spring to turn up from its present business decline, heavy construction is going strong. Though industrial building and private mass housing contracts are slowing, commercial building and public works are surging.

The federal government's new Administration has as a main concern the business decline and the stimulants that might help reverse it. Public works are mentioned as one area of the economy readily stimulated. However, this method of stepping up spending is notoriously slow. Moreover, we submit that public works construction is already healthy enough to offset the lag in private construction. True, highway, sewerage and flood control construction can stand some stimulus, which would add to real construction growth. But the more pressing need is to stimulate industrial building—by tax reform or by more liberal depreciation policy. Then, construction as a whole could truly lift the economy's rate of growth.

Whatever the stimulants administered, there is always the danger of overdose. Too much stimulation of public works could put materials supply and demand into imbalance and mean loss of the cost stability construction enjoyed in 1960. Construction costs rose less in '60 than in any year since 1949. A sudden spurt in public works without concomitant industrial building could return the construction industry to the ridiculous profitless bidding to which it fell victim near the end of the 1958-59 recession. Bid price indexes fortunately picked up as construction volume picked up in the latter half of 1960.

And therein lies the task for '61. The construction industry must handle an increasing, probably a stimulated, volume of public works in a period of imbalance between public and industrial construction. It must do this without inflation of its costs, without bidding itself back into profitless prosperity.

The business trends described in the pages that follow show the way to increased volume. It will be volume with profits to the extent that the industry's management and engineering techniques are the best available on major projects such as those described in this annual ENR survey.

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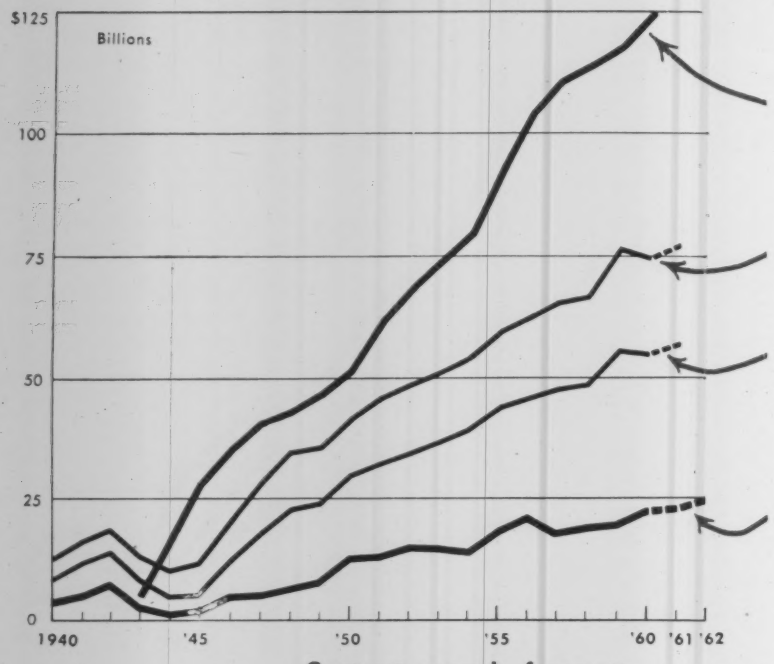
Outlook for '61: Public Works

New Heavy Construction Business Soars



Record Plans: $125 billion in proposed heavy construction is in the planning stage.

Construction Spending: Of the $78 billion estimated for '61, maintenance and repair accounts for $21 billion . . .
. . . new construction put in place rises 40% to $57.3 billion.

Heavy Construction Contracts: They'll rise 2% in 1961, add 7% more in 1962, ENR forecasts.

Contract awards forecast

add 000

	1960 Actual	1961 Forecast	Change '60-'61 %	1962 Forecast (Prelim.)	Change '61-'62 %	
All Heavy Construction	$22,904	$23,450	+ 2	$25,130	+ 7	Rise to slow in '61, speed up in '62
By Ownership						
PRIVATE	12,097	11,500	− 4	12,150	+ 6	Temporary dip
PUBLIC	10,807	11,950	+11	12,980	+ 9	New record
State & Municipal	8,350	9,250	+11	10,030	+ 8	
Federal	2,457	2,700	+10	2,950	+ 9	
By Type of Work						
PUBLIC—						
Waterworks	455	450	− 1	490	+ 9	Steady in '61, up in '62
Sewerage	619	725	+17	775	+ 7	Sharp rise this year
Bridges*	786	775	− 1	840	+ 8	Levels off, then up again
Highways	3,401	3,900	+15	4,300	+10	Sustained rise ahead
Earthwork, Dams, Waterways	780	1,050	+35	1,175	+12	California sparks boom
Buildings:						
Excluding Housing	2,564	2,900	+13	3,200	+10	'60 Rebound gains momentum
Housing	735	800	+ 9	900	+13	
Unclassified†	1,467	1,350	− 8	1,300	− 4	
PRIVATE—						
Buildings:						
Mass Housing	5,762	5,350	− 7	5,150	− 4	1-Family house volume off
Commercial	2,539	2,850	+12	3,100	+ 9	Up & up with demand
Industrial	2,792	2,500	−10	3,000	+20	Temporary lull in '61
Unclassified#	995	800	−20	900	+13	Less pipeline work

*Includes private bridges. †Mainly airports, missile bases and tunnels. #Mainly pipelines, transmission lines and private hydro.

Will Spark Another Record Year

- **Look for contract awards of $23.5 billion this year—about 2% better than the record set in 1960.**
- **This increase will come despite a slight decline in private building. State and federal construction spending will take up the slack.**

The Sixties have begun auspiciously for heavy construction. Contractors' new business soared 12% to a record high of $22.9 billion—finally topping 1956's record.

At the same time, new business also moved faster onto the drawing boards of engineers and architects. New plans scored a healthy increase for the second consecutive year, as if to reaffirm and to underscore the year-ago sentiment that the Sixties would be a decade of rapid growth for the construction industry and the U. S. economy as a whole.

The record $125 billion of heavy construction now planned or in the planning stage, according to ENR's Backlog of proposed work, represents almost overwhelming pressure for further increases in annual contract volume. The current backlog, in fact, is equivalent to almost six years work at the record 1960 pace.

In addition to pressure exerted on the market by this record amount of projects in the planning stage, 1961 construction is likely to feel the initial impact of the new Administration's policies. Construction apparently rates high with the Administration as a recession-beater and as a prerequisite for national economic growth. So it's very likely that public works construction will receive increasing stimulus from Washington—more in recessions that in expansions, but nevertheless a constant year-in, year-out emphasis.

An increase of at least 2% will lift 1961 heavy construction contract volume to an all-time high of $23.5 billion, ENR forecasts. Were it not for some easing up in the flow of new private construction through the planning stage, this year's contract total could be expected to rise a whole lot more. The booming public works market, which ENR sees heading for an 11% jump in contracts, will be more than enough to offset the anticipated 4% decline in private heavy construction.

This forecast is not quite as stout as the preliminary forecast made last fall (ENR Sept. 8, 1960, p. 21), mainly because the steady uptrend in mass housing contracts tripped suddenly near the end of 1960. The economic "recession" early this year and slow sales of used homes (making the "upgrading" market sticky) indicate that this year will likely see a moderate decline in total mass housing contracts as shown by ENR figures, which include projects costing $400,000 or more. This slide in housing will be limited to large one-family house projects, while apartments, hotels and other private residential construction will probably sustain their 1960 rise for another year. Housing starts might increase slightly, however, in 1961 because of the sharp uptrend in mass housing awards during 1958-60.

The weakness in housing, combined with expected declines in industrial building and "unclassified," will offset another sharp gain in commercial building. Thus the 1961 private heavy construction market will probably come short of 1960 by 4%. However, private contract volume would still be the third largest in history, exceeded only by 1960 and 1956's record.

By contrast, surging public works will keep contractors increasingly on the go this year. There should be sharp gains in these key types of public construction: Sewerage, highways, earthwork-dams-waterways and nonresidential building. Moreover, if federal aid for sewage treatment plant construction and highway construction is expanded in fiscal 1962, which begins July 1, these two categories would provide contractors with even bigger volumes of new contracts than forecost here by ENR.

The Corps of Engineers is likely to figure in a hefty increase in federal earthwork-dams-waterways contracting, especially for flood control and irrigation.

But the major stimulus for this type of heavy construction will come from California's Feather River water development project, which should get rolling this year. California voters last November Ok'd the $1.75-billion bond issue to finance this 10-year project.

Look also for a hefty increase in federal building contracts, under the auspices of policy switches in 1960 by the old Administration as well as new policies of the new Administration.

To pay for the 1961 expansion of public works, state and local governments will have to borrow a record amount of long-term capital. This can be accomplished without pressuring borrowing rates back up to where they would likely crowd some would-be government borrowers out of the capital market.

There is a joker in the state and local financing picture to watch out for: The trend in tax revenues from state and municipal levies on income, sales and other business activity may fall short of budgeteers' forecasts for fiscal 1961 because of slack business in several spots across the country. This is unlikely to affect contracting in calendar 1961. But if the recession doesn't turn out to be mild and of short duration, disappointing tax receipts could dampen the expansion of state and local public works in 1962.

Total spending for construction in 1961 will increase 4% to a new high of $78.3 billion. This includes a record $57.3 billion new construction put in place, forecast by the US Census Bureau. Though this would be 4% more than the Bureau's latest estimate for 1960 volume, it would be only 2% above the revised 1959 record volume. The spending estimates cover construction previously awarded. So the 4% rise seen in 1961 spending relates more to 1960's 12% jump in heavy construction awards than to the 2% gain forecast for 1961 contracts.

In addition, spending for maintenance and repair will probably hit an all-time high of $21 billion, ENR predicts. This would represent a two-year rise of 9% over 1959's $19.3 billion, the latest official maintenance and repair spending estimate by the Census Bureau.

Planning Ahead: $125 Billion on the Drawing Board

ENR Backlog of Proposed Heavy Construction in the Planning Stage, Dec. 31, 1960

Summary of projects on file with ENGINEERING NEWS-RECORD covering proposed construction estimated to cost these minimum amounts or more: waterworks, excavation and irrigation, $53,000; other public works, $88,000; industrial buildings, $110,000; other buildings, public and private, $400,000.

New projects proposed during 1960 ..... **(millions) $22,657**
Projects moved out of backlog into contracts ..... **" 11,496**
Projects abandoned and removed from backlog ..... **(millions) $4,780**
Net increase in backlog during 1960 ..... **" 6,381**

Thousands of dollars (000 omitted), December 31, 1960

States	Public Works Projects: Water-works	Sewer-age	Bridges (includes private)	Earth-work irr.-drain.	Streets and roads	Buildings	Unclassi-fied	Federal govern-ment work	Private Projects: Industrial buildings	Comm'l buildings Housing	Unclassi-fied	Construction: Private	Public	1960 TOTAL	1959 TOTAL	% Change '59-'60
UNITED STATES (50 States)																
1960	**2,919,289**	**4,116,954**	**3,384,982**	**12,134,557**	**13,633,685**	**22,724,361**	**10,072,837**	**14,592,596**	**17,986,051**	**27,273,675**	**10,453,432**	**55,814,365**	**68,885,458**	**124,699,823**		**+5**
1959	2,844,178	3,819,893	3,531,643	12,091,446	12,959,537	21,343,332	9,965,566	14,512,313	17,163,360	23,979,659	10,620,346	51,854,068	66,464,892		118,318,960	
% Change	+3	+8	−4	0	+5	+6	+1	+1	+5	+14	−2	+8	+4	+5		
NEW ENGLAND																
Me.	543	12,647	10,806	3,835	69,952	79,176	97,781	92,372	29,966	41,246	12,273	83,485	274 740	**358,225**	344,510	+ 4
N.H.	16,225	18,041	38,591	10,882	18,030	50,251	37,402	45,837	10,047	28,158	12,131	50,336	189,422	**239,758**	203,127	+18
Vt.	2,423	17,580	5,349	96,717	2,854	51,885	4,055	95,416	4,217	16,458	5,478	26,153	180,863	**207,016**	198,490	+ 5
Mass.	35,035	98,122	137,697	68,714	995,009	774,028	215,820	236,208	304,027	710,949	143,773	1,158,949	2,324,225	**3,483,174**	3,331,701	+ 5
R.I.	6,980	33,826	51,617	4,556	113,841	90,281	30,868	58,703	57,728	73,557	31,098	175,883	318,469	**494,352**	495,529	0
Conn.	34,500	139,619	110,291	166,240	279,698	648,624	105,364	132,027	304,255	780,285	81,899	1,166,794	1,483,981	**2,650,775**	2,603,718	+ 2
1960	**95,706**	**319,835**	**354,351**	**350,944**	**1,479,384**	**1,694,245**	**491,290**	**660,563**	**710,240**	**1,650,653**	**286,652**	**2,661,600**	**4,771,700**	**7,433,300**		**+ 4**
1959	93,348	273,718	348,477	325,957	1,453,243	1,712,817	461,342	694,434	579,850	1,642,985	285,338	2,522,228	4,654,847		7,177,075	
% Change	+3	+17	+2	+8	+2	−1	+7	−5	+22	0	+1	+6	+3	+4		
MIDDLE ATLANTIC																
N. Y.	196,571	314,968	410,574	477,651	970,487	3,343,107	1,526,840	554,521	680,201	3,894,703	265,411	4,843,601	7,236,912	**12,080,513**	10,864,078	+11
N. J.	90,962	170,916	197,023	76,124	1,284,651	919,622	324,286	90,299	716,341	1,375,298	198,431	2,290,871	3,062,783	**5,353,654**	4,861,911	+10
Pa.	21,871	162,422	223,427	353,830	2,399,426	1,425,657	455,455	502,914	1,001,563	1,316,759	274,888	2,596,550	5,038,748	**7,635,298**	6,487,038	+18
Md.	60,169	33,243	2,390	63,278	395,548	330,936	201,407	269,829	415,793	361,247	105,671	882,711	1,086,971	**1,969,682**	1,828,723	+ 8
D. C.	5,507	38,525	69,455	1,998	160,294	335,674	37,940	289,070	3,047	293,465	3,392	299,904	649,393	**949,297**	887,639	+ 7
Del.	2,027	9,700	19,937	50,820	36,096	67,980	11,026	66,263	23,347	126,501	40,004	197,352	190,086	**387,438**	392,532	− 2
1960	**377,107**	**729,774**	**922,806**	**1,023,701**	**5,246,502**	**6,422,976**	**2,556,954**	**1,772,896**	**2,840,292**	**7,367,973**	**887,797**	**11,110,989**	**17,264,893**	**28,375,882**		**+12**
1959	380,738	667,406	1,055,888	1,021,284	4,514,123	5,943,178	2,462,402	1,675,426	2,664,482	5,796,016	816,404	9,292,629	16,029,292		25,321,921	
% Change	−1	+9	−13	0	+16	+8	+4	+6	+7	+27	+9	+20	+8	+12		
SOUTH																
Va.	39,369	88,991	66,664	128,125	263,840	433,002	86,597	279,928	312,883	552,906	79,596	947,575	1,104,398	**2,051,973**	1,690,785	+21
W. Va.	6,379	42,771	9,155	55,218	100,157	118,864	42,939	82,036	54,452	52,429	24,404	131,360	375,408	**506,768**	663,426	−23
N. C.	41,693	58,418	29,941	218,010	44,565	259,532	105,694	379,176	237,801	155,140	138,130	536,349	752,575	**1,288,924**	1,101,397	+17
S. C.	32,386	25,835	8,956	132,016	15,455	162,926	116,941	279,524	489,991	142,631	67,254	699,876	494,515	**1,194,391**	1,143,450	+ 4
Ga.	24,459	37,451	28,621	84,752	44,842	395,708	73,789	228,870	260,765	281,017	122,609	665,141	688,872	**1,354,013**	1,122,709	+21
Fla.	33,415	122,035	102,006	20,932	311,493	312,922	157,544	153,312	411,555	917,388	211,783	1,541,601	1,059,472	**2,601,073**	2,208,573	+18
Ala.	12,052	48,987	17,462	114,456	91,175	356,393	72,196	271,290	592,636	168,927	205,875	967,938	712,221	**1,680,159**	1,668,341	+ 1
Miss.	31,437	11,275	8,245	25,034	5,892	131,290	83,422	101,524	140,685	46,119	283,199	471,943	294,655	**766,598**	782,841	− 2
La.	21,513	46,324	47,021	90,169	111,814	146,634	89,278	184,655	622,069	281,269	510,476	1,414,493	552,074	**1,966,567**	1,926,817	+ 2
Ky.	13,142	54,847	52,774	90,851	85,199	228,922	27,324	200,268	344,313	136,930	186,450	667,693	553,059	**1,220,752**	1,111,283	+10
Tenn.	30,744	53,088	49,524	109,928	38,441	505,630	102,840	366,592	346,186	370,769	199,592	916,647	890,095	**1,806,742**	1,773,318	+ 2
1960	**286,589**	**590,022**	**420,369**	**1,069,491**	**1,112,873**	**3,051,823**	**958,564**	**2,527,175**	**3,813,336**	**3,105,525**	**2,029,368**	**8,960,616**	**7,477,344**	**16,437,960**		**+ 8**
1959	260,461	551,300	420,152	1,063,263	904,744	2,717,504	967,664	2,603,754	3,772,571	2,489,133	2,045,148	8,314,728	6,878,212		15,192,940	
% Change	+10	+7	0	+1	+23	+12	−1	−3	+1	+25	−1	+8	+9	+8		
MIDDLE WEST																
Ohio	188,078	395,790	196,610	136,856	617,980	1,215,715	241,802	257,205	1,192,918	2,041,313	539,779	3,785,914	2,940,927	**6,783,841**	6,303,143	+ 7
Ind.	26,936	43,286	80,407	78,690	449,271	374,200	58,522	106,201	878,387	394,142	168,275	1,441,105	1,111,011	**2,552,116**	2,512,528	+ 2
Ill.	136,327	263,773	242,372	269,136	1,259,957	906,742	457,316	292,931	695,337	1,449,759	300,390	2,432,189	3,515,920	**5,948,109**	5,909,740	+ 1
Wis.	52,304	73,098	50,098	50,974	25,374	326,023	29,868	103,609	188,572	252,310	62,484	503,456	607,639	**1,111,105**	1,068,436	+ 4
Mich.	149,571	310,299	196,388	123,410	368,982	1,139,583	168,117	260,162	548,452	730,188	237,407	1,516,047	2,456,350	**3,972,397**	4,246,079	− 6
1960	**553,216**	**1,086,246**	**765,875**	**659,066**	**2,721,564**	**3,962,263**	**955,625**	**1,020,108**	**3,503,666**	**4,864,712**	**1,398,335**	**9,703,721**	**10,671,847**	**20,393,568**		**+ 2**
1959	560,799	1,042,951	793,033	665,664	2,985,814	3,803,375	952,571	1,029,835	3,495,618	4,513,530	1,226,571	9,263,527	10,776,399		20,039,926	
% Change	−1	+4	−3	−1	−9	+4	0	−1	0	+8	+7	+5	−1	+2		
MISSISSIPPI TO ROCKIES																
Minn.	44,747	42,997	32,822	17,430	35,632	287,897	61,585	39,947	315,084	288,305	124,191	729,427	521,263	**1,250,690**	1,177,945	+ 6
Iowa	8,691	96,616	16,185	70,522	58,077	95,691	16,118	27,145	338,927	118,243	153,738	612,088	360,720	**972,808**	834,911	+17
Mo.	58,449	102,457	46,775	200,992	319,745	496,504	94,044	376,133	381,836	507,087	290,988	1,183,984	1,314,893	**2,498,877**	2,212,493	+13
Ark.	20,095	26,606	6,290	272,023	43,225	131,807	86,096	329,240	311,056	115,118	207,552	633,791	585,077	**1,219,868**	1,175,768	+ 4
N. D.	4,707	4,465	627	159,672		28,462	36,512	196,377	10,234	13,266	51,768	75,518	234,195	**309,713**	305,128	+ 2
S. D.	6,738	3,085	2,925	155,179	22,595	22,141	8,842	165,191	6,147	18,529	61,050	85,726	221,505	**307,231**	293,983	+ 4
Neb.	24,087	31,875	21,312	127,814	39,895	189,513	87,161	180,191	103,132	94,527	87,027	289,139	520,204	**809,343**	817,649	− 1
Kan.	20,370	66,106	10,991	254,190	68,736	180,737	115,324	397,859	80,814	124,039	236,727	441,580	716,454	**1,158,034**	1,129,676	+ 2
Okla.	18,808	30,483	18,685	317,131	141,479	223,311	161,105	498,448	110,609	128,192	229,176	468,466	940,513	**1,408,979**	1,375,248	+ 2
Tex.	575,467	231,970	127,016	1,227,357	228,889	1,524,765	818,172	1,283,952	2,941,852	3,036,099	1,658,518	7,653,412	4,717,693	**12,371,105**	11,764,145	+ 5
Mont.	8,045	12,852	67,353	320,016	7,184	94,176	67,141	394,800	51,883	22,358	34,580	108,821	576,767	**685,588**	640,424	+ 7
Wyo.	4,716	4,732	3,805	193,692	28,897	40,709	25,006	255,723	94,979	15,121	115,696	225,296	301,557	**527,353**	531,804	− 1
Colo.	133,409	20,810	14,455	337,948	147,530	290,728	167,344	525,435	93,913	154,183	232,442	480,538	1,112,224	**1,592,762**	1,569,686	+ 2
N. M.	16,285	9,377	1,250	53,221	3,030	91,349	87,556	168,736	85,767	76,398	230,424	392,639	262,018	**654,657**	795,379	−18
1960	**974,614**	**684,431**	**370,491**	**3,707,187**	**1,144,914**	**3,697,790**	**1,832,006**	**4,859,187**	**4,926,233**	**4,711,465**	**3,713,977**	**13,376,925**	**12,388,083**	**25,763,008**		**+ 5**
1959	925,679	589,638	355,193	3,628,373	1,120,439	3,607,292	1,726,837	4,674,310	4,587,181	4,315,021	3,767,986	12,693,945	11,929,694		24,623,639	
% Change	+5	+16	+4	+2	+2	+3	+6	+4	+7	+9	−1	+5	+4	+5		
FAR WEST																
Idaho	3,659	9,649	23,712	100,913	111,291	82,044	27,143	162,105	17,518	21,382	548,413	587,813	357,911	**945,724**	956,432	− 1
Utah	25,108	35,219	4,172	112,266	21,774	171,530	17,555	153,159	59,529	146,408	223,592	429,529	387,624	**817,153**	794,157	+ 3
Ariz.	31,200	15,621	1,766	603,574	56,600	63,638	150,184	725,698	160,125	178,130	274,633	612,888	922,583	**1,535,471**	1,512,163	+ 2
Nev.	9,607	2,037	4,304	37,085		54,976	21,634	43,302	14,862	81,307	14,790	140,950	129,643	**270,602**	242,424	+12
Wash.	94,031	115,432	252,959	1,716,315	722,061	762,954	312,966	1,327,779	440,274	486,296	217,952	1,145,629	3,975,611	**5,121,240**	5,224,938	− 2
Ore.	6,126	48,306	37,776	288,383	26,451	100,386	24,135	295,641	243,589	73,892	247,917	565,398	531,563	**1,098,961**	1,177,478	− 7
Calif.	429,246	468,993	224,715	2,430,775	857,297	2,526,193	2,585,953	872,852	1,152,306	3,689,744	629,519	5,472,442	9,522,299	**14,994,741**	14,878,678	+ 1
Alaska	24,383	6,364	1,686	17,052	70,555	58,548	69,579	151,902	39,081	133,684	37,499	210,264	248,167	**458,431**	369,799	+24
Hawaii	8,697	5,025		17,805	62,419	74,995	69,249	20,229	65,000	762,504	3,088	830,592	238,190	**1,068,782**	807,390	+32
1960	**632,057**	**706,646**	**551,090**	**5,324,168**	**1,928,448**	**3,895,264**	**3,278,398**	**3,752,667**	**2,192,284**	**5,573,347**	**2,227,403**	**9,995,514**	**16,313,591**	**26,309,105**		**+ 1**
1959	623,153	694,880	558,900	5,386,905	1,981,174	3,559,166	3,394,750	3,834,554	2,063,658	5,222,974	2,477,899	9,767,011	16,196,448		25,963,459	
% Change	+1	+2	−1	−1	−3	+9	−3	−2	+6	+7	−10	+2	+1	+1		
CANADA																
1960	**219,668**	**283,198**	**257,446**	**768,766**	**1,244,571**	**2,387,701**	**1,397,730**	**961,416**	**2,904,596**	**1,765,126**	**2,021,535**	**6,693,465**	**6,556,872**	**13,250,337**		**− 4**
1959	203,399	284,575	274,878	832,758	1,108,769	2,275,299	1,419,037	946,258	2,675,089	2,512,974	2,223,843	7,414,730	6,395,891		13,810,621	
% Change	+8	−1	−7	−8	+12	+5	−1	+2	+9	−30	−9	−10	+3	−4		

skyborne motel flies on four RAYMOND piles

A fresh accent to the jet age, the wing-shaped Airwayte Motel at Washington Airport is unusual in several ways. First, of course, all the rooms are up in the air. Then, each section stands on four Raymond-driven piles, a remarkably small number for a building of this size. And finally, the whole foundation was started and *completed* between Christmas and New Year's Eve. ■ The point is that Raymond is ready to tackle any sort of foundation job, whether it calls for 8, or 800, or 8,000 piles. Every project is a big one to the contractor, and Raymond treats each one with equal care and all possible speed. ■ Whatever foundations your projects may require, remember Raymond. We're equipped with men and materials to build economically and rapidly. Give us a call and we shall be happy to consult with you.

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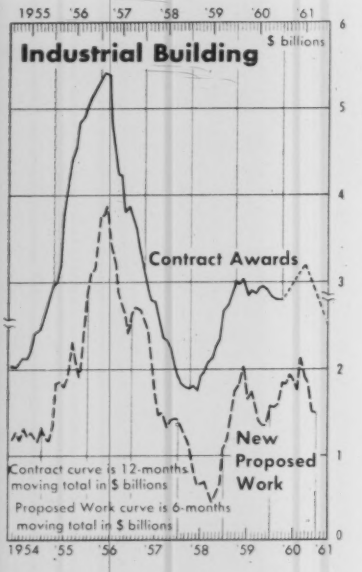
The 1961 Outlook for Major

ENR's exclusive Proposed Work records are the advance indicators of future construction contracts. There are reasonably consistent lead-lag times between the time plans are initiated and the setting of construction contract date for several categories of heavy construction business.

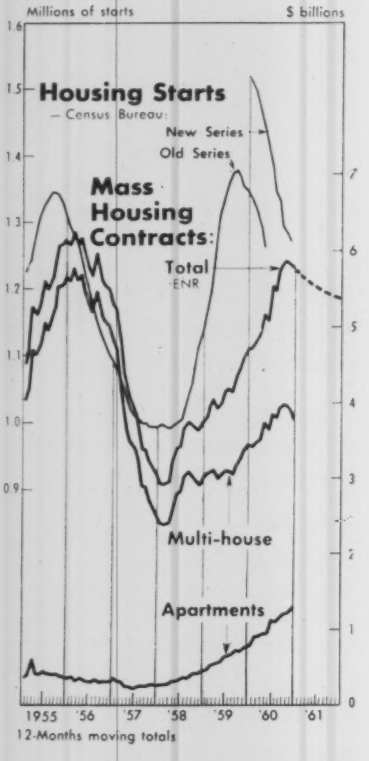
A rise in the flow of new proposed work into ENR's Backlog leads to a future increase in the construction contract rate. Timing of such an increase in awards depends, however, not only on the usual lead-lag relationship for the particular type of work. It also depends on when these factors are favorable:

- Cost and availability of the "Four

Industrial Building contracts nosed down late in 1960. Despite postponement of some plant construction awards to 1960 because of 1959's steel strike and despite a heavy volume of new plans during the first few months of last year, the 1960 contract total dipped 7%. This year's volume will probably drop 10% because of the slump in new plans initiated during the past seven months. It takes six to nine months for such a drop in new plans to bring about a cut in the flow of plants out of the planning stage into construction contract. So industrial contract volume is likely to ease up this spring and remain "off" through the fall. The 1959-61 "cycle" is following the pattern set earlier in the Fifties. Watch the trend in new proposed plants to flag the next upturn in industrial building awards, which will probably come late this year or early in 1962.

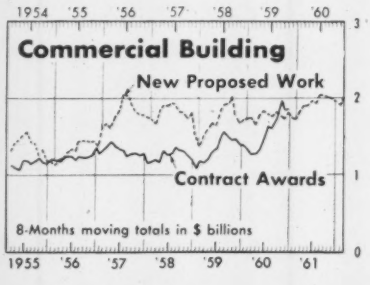


Private Mass Housing volume apparently peaked out last year. The decline came in the final quarter in one-family house projects, according to ENR figures, which include contracts and other projects announced by developers who handle the construction themselves. By contrast, apartment houses and other mass housing—hotels, motels and dormitories mainly—still trend upward. Housing start estimates—designed to include all permanent dwelling units whereas ENR data includes projects costing $400,000-up—dropped 18% in '60. Fewer dwellings were started despite an upswing in new mortgage capital during the second half of '60 that helped ease interest rates and mortgage discounts in some parts of the country. The key to the failure of this easing in credit to revive the housing market is probably the increasing amount of mortgage credit needed per transaction, especially in the "upgrading" operation. Here, the need for mortgage credit is boosted by increased costs of the new home and its land and by inflated prices paid for used homes. Moreover, the discounts are often added into the selling price, and thus to the mortgage.



Public Building is on the rebound after a prolonged slump that reflected the recession of 1957-58 and, in the case of school contracts, mirrored the 1956-57 drop in the new mass housing developments. Plans for new buildings have been on the rise since late 1959. During the past year, new public buildings with an estimated construction cost of over $4.7 billion were proposed and added to ENR's Backlog of heavy construction in the planning stage. This increased flow into the Backlog—11% greater than during 1959—will keep the public building contract trend on the upgrade at least through 1962. That's because these projects generally take 18 months to over two years to pass through the planning stage into construction con-

Commercial Building is finally taking giant steps necessary to catch up with demand. Contract awards jumped 41% in the last two years and another gain of 12% is in prospect for 1961. Thus in only three years this market should climb more than 50%. But even this fast increase will raise it only a few steps up the ladder of needed growth. During the Sixties, commercial building should climb to the point where, on the average, it exceeds industrial building contract volume. New plans poured into ENR's Backlog of proposed work in 13% heavier volume last year than in 1959. Estimated cost of these projects rang up a whopping total of $3.1 billion, including office buildings, stores, shopping centers, private schools and other institutional building. The surging volume of plans during 1960 reversed the sluggish trend in the latter half of 1959.



Heavy Construction Markets

M's"—Money, Manpower, Materials and Machines.

- Federal fiscal policy.
- General economic conditions and their effect on business profit expectations and capital spending plans.

The outlooks for major markets are charted and discussed briefly below. Not included are highways and bridges, whose trends in the Sixties will be geared closely to federal aid, which is increasing.

ENR contract award figures include projects of these minimum sizes or larger: water supply, earthwork and waterways, $53,000; other public works, $88,000; industrial building, $110,000; and other buildings, $400,000.

tract status. This year, the uptrend should accelerate as federal building awards perk up, no longer act as a drag on the total volume.

12-Months moving totals in $ billions

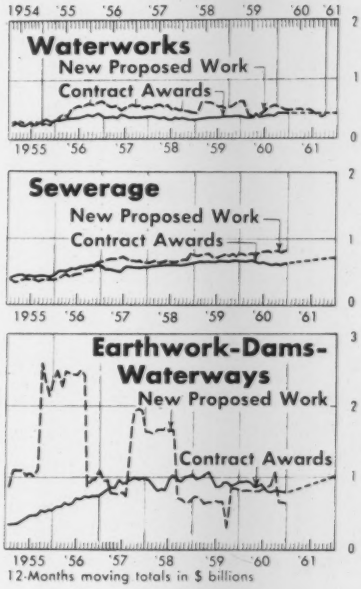
Water Resources Works

will spark the 1961 uptrend in heavy construction other than building.

Waterworks contracts should come close to 1960's all-time high. Further rise is possible if some more of the large projects in the planning stage for several years can get moving. Hundreds of millions worth of proposed waterworks construction is involved in these relatively few big projects. So the downward drift in the proposed waterworks trend shown in the chart is necessarily not indicative of the contract trend over the next year or two.

Sewerage construction awards turned down temporarily in 1960, though new proposed work rose 4%. Because of great variation in the time it takes for different phases of a large sewerage project to pass through the planning stage to the construction bid stage, the proposed work curve is not a precise predictor of year-to-year changes in contract volume. However, the uptrend in proposed sewerage work seems to point to substantial increases in future contracts.

Earthwork-dams-waterways contract volume is also hard to predict from proposed work trends because of widely varying lead times. For example, California's Feather River project, which is set to start rolling this year went into ENR's Backlog in 1955, causing the sharp rise in the proposed work curve shown in the chart.



12-Months moving totals in $ billions

Industrial Building Awards

Reported by ENR; value in thousands

Industry	1960 No.	1960 Value	% Change '59-'60 No.	% Change '59-'60 Value
Transportation Service				
Railroad	11	$ 2,602	+10	−69
Automotive	157	64,924	+ 5	+23
Public Utilities	81	502,962	−19	−17
Process Industries[1]	630	1,105,736	+22	+ 1
Food Industries[2]	271	131,745	−19	−31
Metal Refining & Rolling	112	347,816	+13	−17
Metal Working Plants				
Auto	32	68,357	+52	+23
Aircraft	28	13,963	−60	−68
Foundries	12	7,949	−20	+76
Mach. & Mach. Parts	337	204,471	− 3	− 1
Radio, TV & Electronics	49	46,709	−26	−11
Textiles (excl. rayon)	61	16,437	+ 9	−49
Wood Industries	39	13,738	− 5	−19
Miscellaneous				
General Factories	683	259,357	+ 6	−24
Refrig. & Cold Stor.	14	5,336	+75	+150
Total, priv. financed	2,517	2,792,102	+ 2	− 7
Fed. Owned Plants	306	207,122	+18	−49

[1] Incl distilleries.
[2] Incl: breweries; frozen food plants, lockers.

Commercial Building, Mass Housing, and Public Building

Contracts reported by ENR, in millions of dollars

	1959	1960	Change 1959-'60 %
Commercial Buildings*	2,161	2,539	+17
Private Mass Housing	$4,701	$5,762	+23
One-family homes	3,437	3,786	+10
Apartments	769	1,320	+72
Hotels and motels	338	464	+37
Institutional	157	192	+22
Public Mass Housing	591	735	+24
State and municipal	261	408	+56
Slum clearance	162	293	+81
Other	98	115	+17
Federal, military	330	328	− 1
Public Nonresidential	2,604	2,564	− 2
State and municipal	1,812	2,031	+12
Federal	792	533	−33
Industrial	409	207	−49
Other	383	326	−15

* Incl. offices, stores, shopping centers, private schools, hospitals and other private institutional buildings.

Private Unclassified

Contracts reported by ENR, in thousands

Private	1959*	1960*	Change 1959-'60 %
Transmission Lines	$115,673	$64,077	−45
Pipelines	216,874	634,076	+192
Railroads	31,636	11,157	−65
Telephone	23,613	25,092	+ 6
Drive-in Theatres		200	
Radio & TV	3,786	8,235	+118
Airports	16,986	3,088	−82
Other[1]	140,549	248,684	+77
Total Private	549,117	994,609	+81
Public—Federal			
Airports, Airbases[2]	530,795	597,31[illegible]	+13
Missile Bases	354,793	462,443	+30
Hangars, Buildings	169,723	125,970	−26
Airport Housing	43,199	27,361	−37
Airport Facilities & Util	98,484	66,105	−33
Shipyards	27,253	11,958	−56
Other	73,585	89,902	+22
Total Federal	943,039	918,608	− 3
Public—State & Municipal			
Airports	157,500	185,847	+18
Subways, Tunnels	86,062	130,227	+51
Other	177,388	232,286	+31
Total State & Mun	420,950	548,360	+30
Total Public	1,363,989	1,466,968	+ 8
Total Unclassified	$1,913,106	$2,461,577	+29

* 50 States in 1960; 48 States in '59 tabulation.
[1] Incl private-owned hydro-electric power plants.
[2] Incl missile bases: $354,793 in '59; $462,443 in '60.

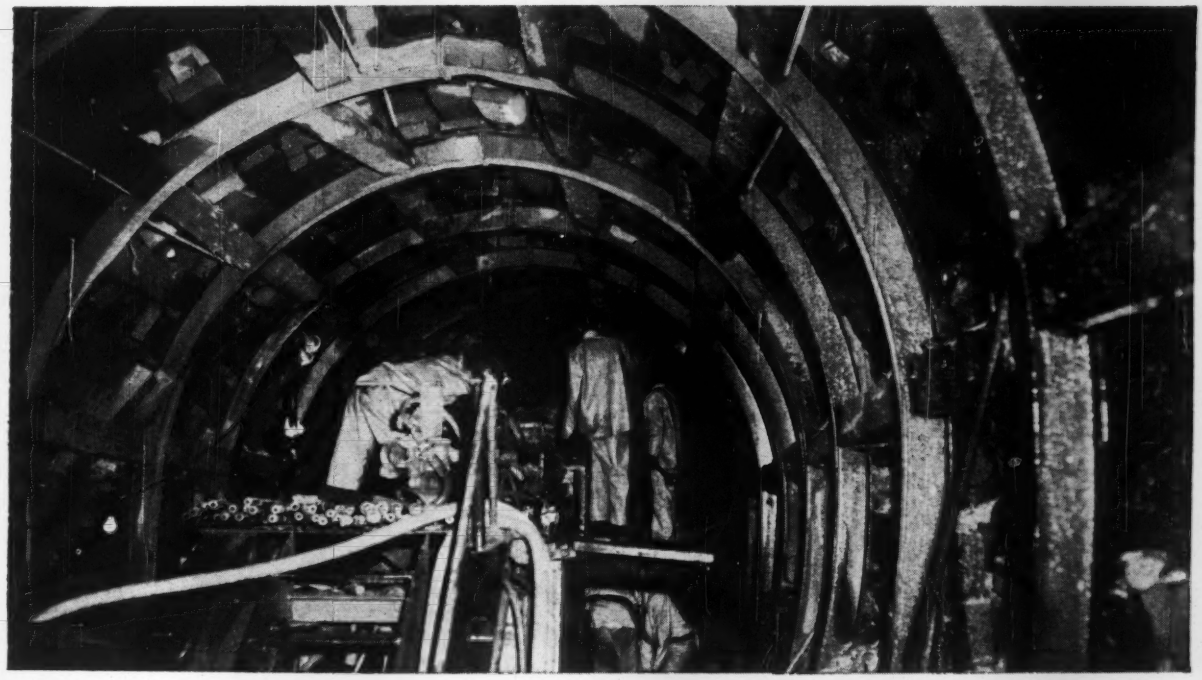
Going Ahead: $22.9 Billion in '60 Contracts

In Thousands of Dollars (,000 omitted)

States	Public Works Contracts: Water-works	Sewer-age	Bridges*	Earth-work irr.-drain.	Streets and roads	Buildings: Resi-dential	Buildings: Other	Unclassi-fied†	Federal govern-ment works	Private Contracts: Industrial buildings	Commercial Buildings: Resi-dential	Commercial Buildings: Other	Construction: Private	Construction: Public	1960 Total 52 Weeks	1959 Total 53 Weeks	% Change '59-'60
UNITED STATES																	
1960	454,609	619,458	794,480	779,854	3,400,839	735,487	2,564,418	2,461,577	2,457,279	2,792,102	5,762,186	2,539,022	12,096,614	10,807,418	22,904,032		
1959	375,782	655,196	570,340	914,817	2,898,891	590,612	2,603,944	1,958,293	2,831,679	2,993,318	4,700,683	2,160,632	10,421,196	10,001,312		20,422,508	+12
% Change	+21	−5	+39	−15	+17	+25	−2	+26	−13	−7	+23	+18	+16	+8	+12		
NEW ENGLAND																	
Me.	945	892	4,073	69	18,102	17,006	10,160	4,785	18,969	4,511		1,677	6,338	55,882	62,220	89,478	−30
N. H.	189	885	1,222	220	15,134	1,013	7,433	8,519	10,979	1,245	5,450	6,504	13,199	34,615	47,814	64,503	−26
Vt.	237	1,424	143	74	16,052	2,116	5,414	12,527	12,702	815		2,128	2,943	37,987	40,930	40,785	+0.4
R. I.	5,103	754	554	1,091	10,171	12,206	11,752	7,153	41,148	46,968	173,158	85,144	305,712	226,531	532,243	502,965	+ 6
Conn.	2,971	17,516	490	3,382	21,407	22,296	90,485	14,515	14,950	9,397	8,520	11,260	29,227	48,734	77,961	41,859	+86
									33,893	45,106	283,493	117,589	459,415	162,805	622,220	530,850	+17
1960	16,233	31,081	16,846	13,627	137,418	87,117	205,465	69,636	132,541	108,042	473,621	224,302	816,834	566,554	1,383,388		
1959	27,431	29,880	15,416	17,999	194,100	35,040	140,899	105,300	95,371	101,616	414,691	187,768	715,828	554,612		1,270,440	+ 9
% Change	−41	+4	+9	−26	−29	+149	+46	−34	+39	+6	+14	+19	+14	+2	+9		
MIDDLE ATLANTIC																	
N. Y.	20,747	62,949	193,701	16,100	278,490	76,462	317,762	100,492	68,244	111,600	842,195	415,815	1,383,221	1,053,092	2,436,313	1,918,878	+27
N. J.	5,574	17,844	8,710	5,475	60,548	39,992	69,328	24,679	20,108	76,653	703,303	92,893	875,587	228,815	1,104,592	950,454	+62
Pa.	8,064	27,716	14,403	41,217	146,758	20,161	77,339	14,603	51,692	179,457	343,375	77,274	604,319	343,084	950,403	845,952	+12
Md.	13,742	13,691	18,298	724	65,153	7,355	58,585	21,818	45,532	70,733	251,033	47,316	371,783	193,395	565,485	373,559	+52
D. C.	8,203	7,408	11,283	292	16,045	5,845	87,476	18,579	97,216	1,515	24,523	23,854	51,980	155,131	213,111	169,165	+26
Del.	86	1,311	115	405	6,046	6,438	4,715	4,107	6,333	43,240	27,340	5,054	82,979	23,180	106,159	126,865	−17
1960	56,416	130,919	246,510	64,213	573,040	159,254	615,235	184,286	289,125	483,231	2,203,135	651,714	3,372,975	2,001,998	5,374,973		
1959	50,664	140,470	88,987	75,659	421,167	117,014	508,348	187,959	244,074	473,328	1,681,496	656,781	2,825,919	1,555,254		4,381,873	+23
% Change	+11	−7	+177	−15	+36	+34	+21	−2	+18	+3	+32	+1	+19	+29	+23		
SOUTH																	
Va.	5,611	8,792	50,903	6,380	69,425	4,614	67,537	188,781	71,397	74,756	68,304	47,887	247,982	345,008	592,990	296,586	+100
W. Va.	181	2,705	6,093	9,527	26,291	7,608	12,785	2,050	17,206	19,910	1,225	3,252	25,695	65,942	91,637	122,827	−25
N. C.	4,194	10,228	12,386	4,906	40,879	8,558	29,407	89,729	35,578	44,484	19,018	63,289	233,732	123,353	357,378	382,695	− 6
S. C.	2,825	4,146	6,043	5,670	32,083	8,699	14,718	9,714	18,491	78,715	25,044	11,555	143,887	81,325	225,212	331,235	−32
Ga.	3,462	8,569	8,509	22,642	32,185	11,254	27,331	19,634	38,496	28,257	75,805	43,146	155,777	178,017	333,794	419,978	−32
Fla.	11,482	16,353	10,962	16,387	90,970	20,768	65,486	57,490	59,391	100,292	101,931	104,115	331,459	275,753	543,239	587,884	− 1
Ala.	10,378	9,294	24,357	19,417	58,926	7,851	39,340	12,038	58,038	73,735	31,842	23,691	134,352	174,557	308,909	294,409	+ 6
Miss.	8,633	4,305	8,807	5,274	34,934	19,542	12,898	29,518	34,934	9,339	5,156	2,217	13,712	118,011	131,723	133,158	+ 1
La.	4,115	22,497	31,008	30,653	70,673	6,397	37,697	19,702	28,884	29,421	1,915	22,537	57,453	213,152	270,605	343,025	−20
Ky.	3,342	13,555	6,936	3,670	60,042	6,798	90,448	5,779	72,449	75,610	12,220	21,947	111,715	188,332	300,047	296,074	+ 1
Tenn.	4,862	7,401	10,931	12,805	65,524	11,003	51,974	23,750	53,491	82,307	43,107	24,172	155,401	333,333	488,734	420,781	−19
1960	59,385	107,845	176,915	137,331	581,932	113,992	459,821	445,215	491,385	616,826	415,557	373,813	1,573,377	1,334,873	3,333,537		
1959	66,260	127,744	111,133	132,324	658,056	125,356	556,992	334,390	635,178	816,845	376,338	285,214	1,532,447	1,900,205		3,592,652	− 3
% Change	−10	−16	+59	+ 4	−12	−10	−19	+33	−23	−24	+11	+31	− 2	− 4	− 3		
MIDDLE WEST																	
Ohio	16,351	52,122	8,299	4,700	201,108	16,244	83,535	29,508	26,302	198,631	463,506	111,589	782,449	403,124	1,185,573	1,142,375	+ 4
Ind.	7,125	6,335	30,581	3,314	51,249	6,799	41,656	7,717	6,101	61,801	18,614	18,420	102,404	151,207	253,611	419,733	−40
Ill.	21,722	37,332	68,045	15,334	188,363	107,882	113,336	127,856	51,983	132,710	228,147	223,902	814,179	654,150	1,214,329	1,109,238	+14
Wis.	12,365	27,691	10,117	1,170	63,545	3,283	66,936	21,944	2,190	23,730	19,847	58,210	117,847	191,041	308,888	309,174	− 1
Mich.	23,828	6,644	22,970	20,736	183,375	13,237	31,347	18,179	47,196	42,340	27,225	19,031	91,432	315,549	406,981	526,028	−22
1960	81,391	130,124	140,012	45,254	687,640	147,445	335,810	205,254	133,772	453,212	757,339	431,731	1,707,141	1,715,071	3,422,212		
1959	43,694	149,884	136,290	62,308	511,727	89,755	398,388	231,690	288,366	828,535	746,764	307,483	1,976,878	1,529,670		3,506,548	− 2
% Change	+86	−13	+3	−27	+34	+64	−15	−11	−54	−45	+1	+40	−14	+12	−2		
MISSISSIPPI TO ROCKIES																	
Minn.	12,421	22,631	9,458	1,848	66,253	522	55,474	43,879	5,705	146,126	14,141	59,002	250,953	180,802	431,755	363,794	+19
Iowa	3,012	6,174	9,697	7,574	94,313	668	23,400	17,557	11,842	34,398	16,972	13,731	81,113	145,583	227,696	181,600	+25
Mo.	4,480	9,578	23,537	13,150	89,461	23,628	41,090	13,259	38,524	56,309	113,782	68,044	245,499	211,119	453,619	387,746	+18
Ark.	2,579	3,470	7,490	35,124	35,641	14,510	14,734	51,833	75,325	30,695	15,051	5,700	70,519	146,308	216,827	147,359	+47
N. D.	152	668	1,518	5,047	26,170	6,407	3,762	20,272	28,108	819	846	2,431	9,776	58,316	68,092	74,054	− 8
S. D.	2,813	342	8,380	47,570	39,754	3,432	9,159	37,058	89,208	3,160	959	1,690	6,260	148,357	154,617	193,142	−20
Neb.	650	7,512	10,638	13,554	29,911	8,256	10,401	49,102	55,255	2,705	9,564	8,497	32,041	118,749	150,790	148,550	+2
Kan.	2,928	7,929	13,239	9,429	42,815	20,181	24,319	76,449	89,103	12,812	12,407	24,522	65,400	181,630	247,030	178,899	+38
Okla.	55,336	4,238	9,208	46,673	40,493	8,754	18,420	53,447	88,422	11,546	6,820	8,013	44,335	218,623	262,959	187,446	+40
Tex.	38,090	37,344	12,043	60,822	262,531	31,435	125,962	247,274	128,840	405,209	663,261	298,432	1,543,999	639,925	2,183,534	1,754,778	+24
Mont.	188	1,671	3,810	1,996	26,592	5,025	13,290	15,333	14,803	500	1,899	555	11,626	59,234	73,860	76,712	− 8
Wyo.		269	6,101	1,997	26,951	5,595	7,132	14,391	15,772	65,175	500	2,608	72,825	57,894	130,719	92,790	+41
Colo.	14,949	3,186	4,310	3,980	42,454	4,197	25,789	18,981	16,729	25,443	115,553	28,540	175,857	111,525	287,382	359,355	−20
N. M.	983	2,397	681	4,224	33,417	3,379	13,488	76,940	45,285	13,522	20,910	9,507	89,909	89,639	179,548	98,612	+82
1960	139,581	107,409	120,110	253,288	856,856	136,200	387,720	735,775	702,922	808,419	992,665	531,403	2,693,722	2,368,704	5,088,426		
1959	75,112	92,013	140,867	258,830	770,348	116,016	407,074	692,754	805,050	502,751	790,072	398,970	1,969,763	2,275,044		4,244,807	+19
% Change	+84	+17	−15	−2	+11	+17	−5	+6	−13	+61	+26	+33	+37	+4	+19		
FAR WEST																	
Idaho	331	1,285	1,829	1,144	19,166	1,004	15,087	120,951	70,685	3,062		1,411	71,130	94,140	165,270	62,651	+164
Utah	2,755	3,305	2,297	2,959	18,513	1,474	39,221	16,990	23,101	29,516	8,675	8,296	54,850	75,851	130,701	92,517	+41
Ariz.	898	904	1,434	14,157	44,557	3,292	12,250	52,457	66,226	75,800	2,163	37,012	128,825	116,099	244,924	183,176	+34
Nev.		310		535	12,830	3,279	4,228	7,457	7,671		550		5,438	23,751	29,189	26,715	+ 9
Wash.	9,516	11,500	36,938	37,054	47,372	13,297	61,026	131,584	73,987	33,537	29,633	31,814	167,990	275,281	443,271	641,684	−31
Ore.	2,344	7,016	10,324	33,904	53,040	2,510	13,544	77,298	39,448	12,117	19,186	18,158	121,862	127,579	249,441	161,854	+54
Calif.	78,734	81,843	38,755	175,233	347,506	62,377	387,348	325,883	345,835	158,343	771,649	200,739	1,253,026	1,375,384	2,628,410	2,114,058	+24
Alaska	1,903	2,349	1,241	885	9,057	1,628	24,447	58,995	63,042		2,790	5,785	19,545	89,506	109,051	87,170	+25
Hawaii	6,122	3,568	1,269	270	11,912	6,518	14,416	29,125	26,439	947	87,243	12,839	101,599	72,630	174,229	56,363	+209
1960	102,603	112,080	94,087	266,141	563,953	95,379	568,587	822,411	707,434	313,322	921,899	316,054	1,924,235	2,250,221	4,174,486		
1959	112,621	115,205	77,647	367,697	343,493	107,431	590,243	405,900	736,640	270,213	711,322	324,416	1,330,651	2,095,527		3,426,188	+22
% Change	−9	−3	+21	−28	+64	−11	−4	+102	−4	+16	+30	−3	+45	+7	+22		
CANADA																	
1960	27,479	48,143	75,822	222,127	149,446	25,322	253,991	334,869	150,520	379,533	132,283	248,434	978,891	918,558	1,897,449		
1959	22,429	47,884	75,615	40,204	201,179	32,172	204,683	196,417	209,641	242,574	179,996	236,205	719,507	759,851		1,479,358	+28
% Change	+23	+1	+0.3	+452	−26	−21	+24	+70	−28	+56	−26	+5	+36	+21	+28		

* Incl. private: Bridges, public $785,785 ('60) $557,987 ('59); private $6,695 ('60) $12,353 ('59)

† Unclassified, public $1,466,968 ('60) $1,404,083 ('59); private $994,609 ('60) $554,210 ('59)

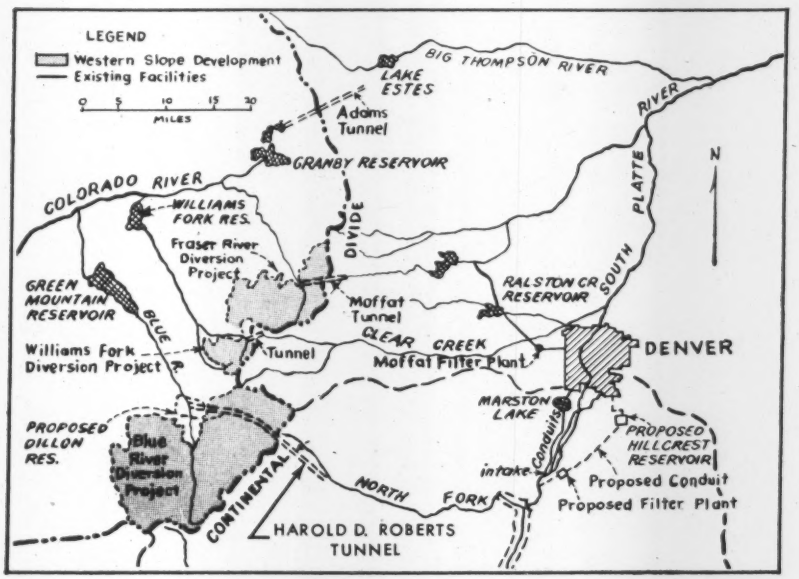


How COMMERCIAL tunnel supports pierce Rockies

As far as water supply is concerned, Denver is on the eastern or wrong side of the Continental Divide. To quench the thirst of Denver's growing population (present water supply will be inadequate by 1970), a $101-million project to tap the Blue River of the water-rich western slope is boring to completion in 1962. An all-important part of this project is the 23 mile long Harold D. Roberts Tunnel.

Tough water problem in tunnel

The first 8½ miles of tunnel lie 600-800 ft. beneath the Snake River through rock faulted with frequent mud slips and high pressure water seams. Here high pressure water, 700 gpm, unchecked by 1500 psi grouting, was encountered and slowed the advance until grout was pumped in four holes drilled 200 ft. into the heading. Bore of tunnel is horseshoe-shaped, 13 ft. 3 in. high and 12 ft. 6 in. wide at springline. In all, 17¼ miles of the tunnel required supports. Standard pattern of support in Pierre shale was COMMERCIAL 6" WF beams @ 20#/ ft., spaced normal on 5 ft. centers. In badly faulted areas of pegmatite, schists, quartzites, gneiss, and coarse-grained, mineralized granite with mud slips and seams, support required spacing down to 2½ ft. centers and 8" WF beams @ 31#/ ft.



8000 square mile, man-made watershed serves Denver.

32 years of COMMERCIAL supports

Entire Denver water supply complex, dating back to early pioneers, will be served by four tunnels: Moffat, Adams, Williams, and Roberts. COMMERCIAL steel supports served Moffat Tunnel (1928), Williams Tunnel (1937), Adams Tunnel (1940). For your next project, COMMERCIAL technical service, backed by over 30 years experience, is available to you for on-the-spot engineering help in tough situations. Write to the Commercial Shearing & Stamping Co., Dept. E-4, Youngstown 1, Ohio.

COMMERCIAL
shearing & stamping

Supply Outlook for Three 'M's

MACHINES will probably be in greater demand this year than last because the pace of contractors' new business is stepping up. Heavy construction awards will rise for the fourth consecutive year. Moreover, most of this year's increase in new contracts will be in heavy construction other than building, pointing to a faster speedup of excavation, grading and earthmoving operations than in over-all construction activity.

So equipment suppliers should do better than in '60. But competition will stay keen, with new equipment challenged by more good used equipment that's available, while rentals are expected to show further revenue gains. This means that contractors will be in a position to drive exceptionally good bargains for their 1961 equipment dollar outlays.

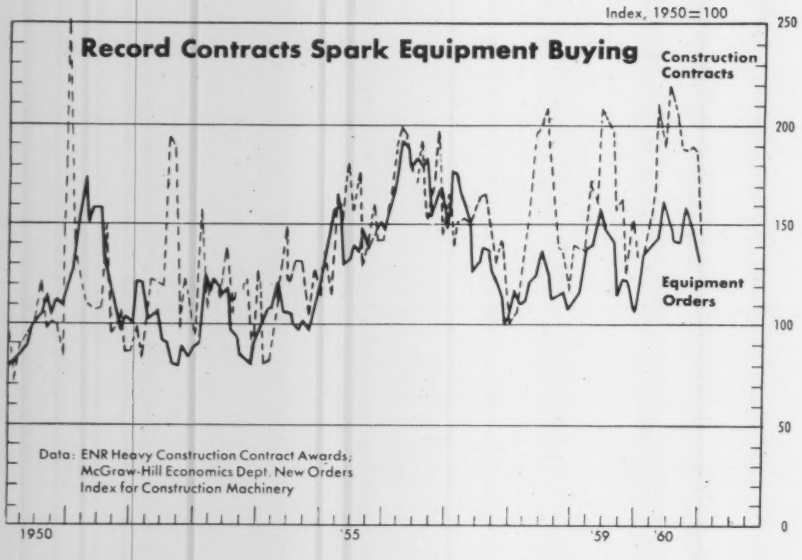
Manufacturers' shipments, including exports, are forecast at $1.6 billion for '61 by the Business & Defense Services Administration, U. S. Dept. of Commerce. This is barely more than one-half of the estimated $3-billion annual capacity of the 600-company industry, BDSA notes.

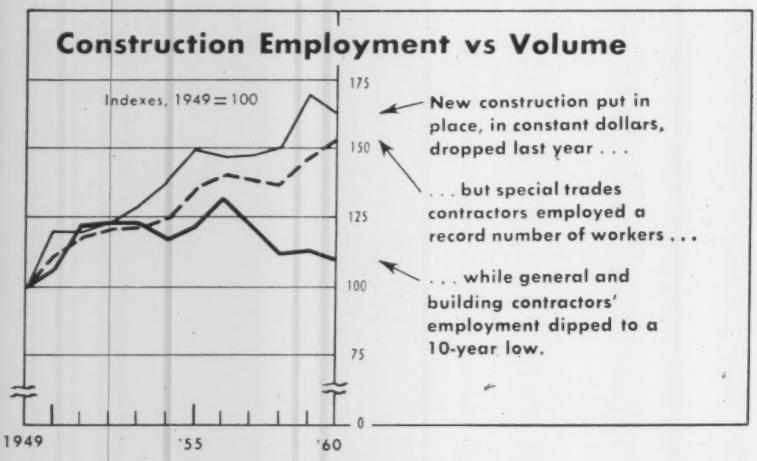
MANPOWER requirements of the construction industry reflect the mechanization of on-site work, improved methods and prefabrication of components. While the estimated value of new construction put in place, measured in constant (uninflated cost) dollars, was second highest on record in 1960, employment in contract construction averaged the lowest in 10 years—exclusive of workers employed by special trade contractors.

By contrast, special trade contractors averaged a record number of employees last year. This reflects the growth of maintenance and repair work. For example, last year saw sharp increases in employees of painting and decorating contractors.

MATERIALS supplies probably have never been in such plentiful supply in the post World War II era. This is because capacity to produce the basic ingredients of construction is higher than ever, while demand for key items has not only been far less than capacity, but well under the highs of the Fifties. So demand has a long way to rise before straining supply.

(For MONEY, the 4th "M," see Business & Finance).




Construction Employment vs Volume
Indexes, 1949=100
175
150
125
100
75
0
New construction put in place, in constant dollars, dropped last year . . .
. . . but special trades contractors employed a record number of workers . . .
. . . while general and building contractors' employment dipped to a 10-year low.
1949
'55
'60

Shipments Climb for Most Key Materials

Material	Source	Unit	1957	1958	1959	1960*	% Change 1959-'60
Steel							
Fabricated structural bookings	AISC	thous tons	3,073.2	2,773.4	3,222.9	3,203.1	− 1
Fabricated structural shipments	AISC	thous tons	4,179.7	3,661.2	2,904.4	3,431.6	+18
Reinforcing bars (net)	AISI	thous tons	2,286.3	2,034.8	2,173.5	1,695.3	−22
Cement, Portland							
Shipments	Bu Mines	mil bbls	297.8	307.0	335.0	314.9	− 6
Concrete pavement awards	PCA	mil sy	94.0	121.3	93.7	105.9	+13
Lumber							
Orders	NLMA	mil fbm	33,257.0	33,593.0	36,006.0	33,486.0	− 7
Production	NLMA	mil fbm	33,572.0	33,579.0	36,530.0	35,069.0	− 4
Shipments	NLMA	mil fbm	33,831.0	33,940.0	36,154.0	34,708.0	− 4
Clay construction products							
Brick, unglazed common and face	Bureau	mil std brk	6,305.9	6,458.8	7,258.0	6,459.6	−11
Structural tile, unglazed	of	thous tons	640.7	542.9	521.3	484.9	− 7
Vitrified clay sewer pipe	Census	thous tons	1,629.0	1,772.3	1,973.1	1,874.4	− 5
Aluminum wrought products (net)							
Sheet & plate, non heat-treatable	Bureau	mil lbs	944.8	944.4	1,284.0	1,117.1	−13
Wire and cable	of	mil lbs	281.6	270.0	321.7	292.8	− 9
Extruded shapes, soft alloy	Census	mil lbs	644.9	692.9	900.5	837.5	− 7
Asphalt products							
Roofing	Bu of	thous sqs	53,326.1	58,228.1	59,821.0	56,830.0	− 5
Siding	Census	thous sqs	1,035.8	1,040.1	952.8	800.4	−16

* Estimated

25-TON MOTO-CRANE

LOOKS different, IS different

This new Lorain Moto-Crane, model MC-325, incorporates all the proven big Moto-Crane features—plus many new ones. The Lorain MC-325 Moto-Crane is fast getting to the job, fast around the job—and has big crane ability to get the big jobs done fast and efficiently. Fully and simply convertible on the job—from crane to dragline, clamshell, shovel and hoe—it can multiply its usefulness to fit any need.

You will find this versatile machine profitable to buy—profitable to use. See your nearby Lorain shovel-crane distributor for complete information—or write direct for a fact-packed bulletin.

THE THEW SHOVEL COMPANY, LORAIN, OHIO

Some outstanding features of Lorain MC-325 Moto-Crane

Now, for the first time, Lorain's Power-Set® Outriggers are standard on our 25-ton machines. All four outriggers set in about a minute . . . move-ups are even faster.

Full-circle cab visibility. Picture window design with 360° visibility from operator's position. Walk-around accessibility.

Removable counterweight, outrigger boxes and beams for highway weight reduction.

"Shear-Ball" turntable connection provides smoother swings—ends adjustment, maintenance, and lubrication problems. 10-year warranty.

Power-operated back-hitch gantry. Controlled from operator's position for maximum capacities or minimum headroom.

New turntable design, all-welded bed and A-frame of heavy steel plate for true shaft alignment.

Square-Tubular-Chord Boom, lighter weight, stronger, 110′ long. Pin-connected for ease of assembly.

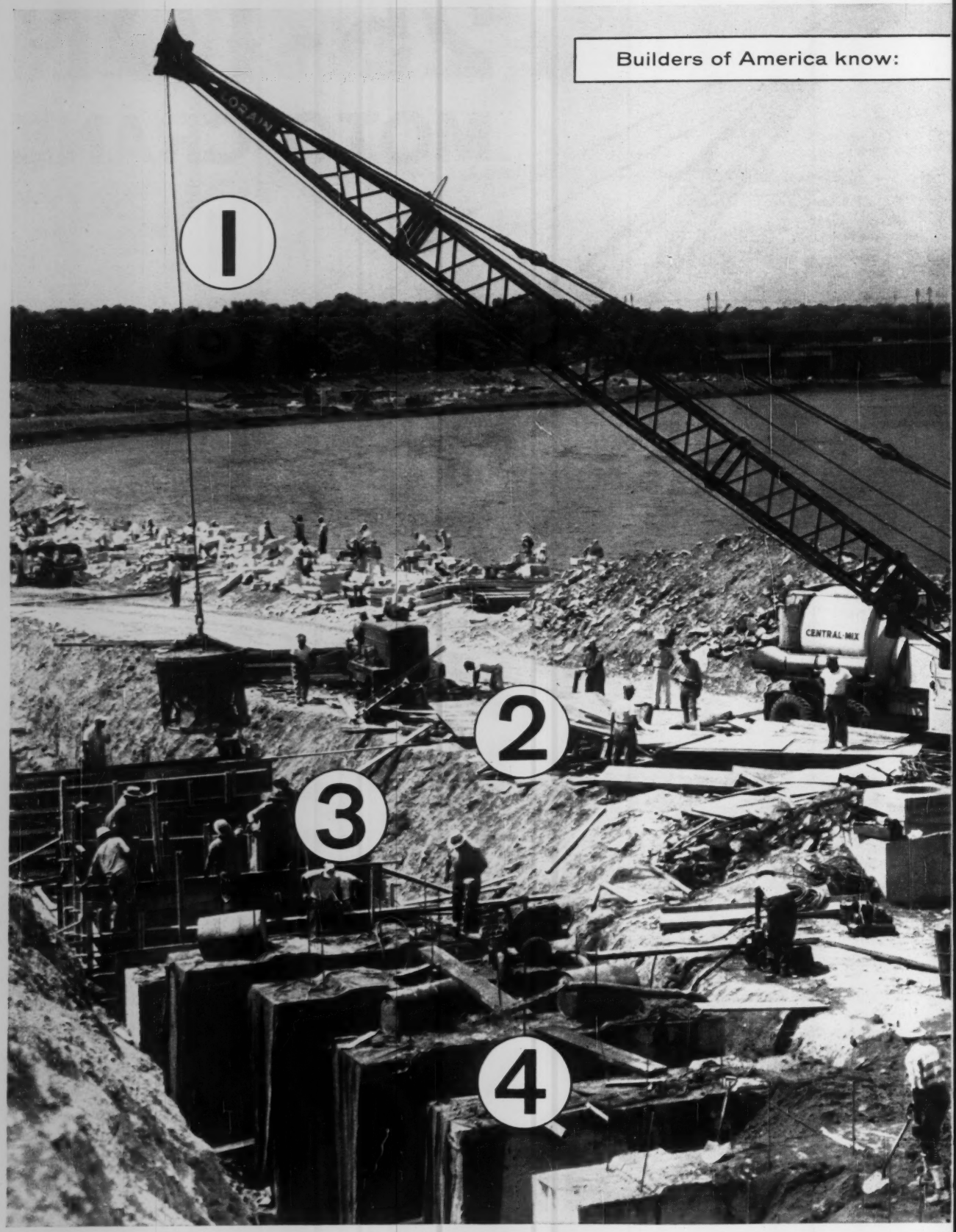
Lorain-built carrier has twist-free, all-welded, box section frame, 15 speeds forward, and a 47-mph highway speed.

LORAIN®
ON THE MOVE

PLANTS in Lorain, Elyria, and Bucyrus, Ohio.

PRODUCTS—Power shovels, cranes, draglines, clamshells, and hoes on crawlers from ⅜- to 2½-yard capacity • Cranes from 7 to 80 tons . . . on crawlers, and as rubber-tire Moto-Cranes, and Self-Propelled Cranes • Rubber tire front-end Moto-Loaders in 6000-lb. and 7000-lb. carrying capacity.

OUTLETS—Lorain products sold and serviced by 249 distributor outlets throughout the world.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When pouring a foundation, think what can happen to schedules if . . .

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2. Workmen trip on scattered materials
3. Form collapses
4. Walk planks kick off

Pouring a foundation is the first step on most jobs. And it can be the crucial one. An accident can shatter the routine and cause you to lose men, materials, equipment . . . and money.

Combatting accidents is one of your most troublesome jobs, but the experienced advice that AM men can give you can make your accident-control program more effective in saving lives, limbs and materials. And that in turn could mean lower insurance rates, lower operating costs, and a better bidding position on your next job.

Over the years, American Mutual has built up an enviable reputation in the construction industry and many AM contractor policyholders who have consulted with the AM Safety Engineers have benefited from a lower accident rate and lower insurance costs. Policyholders also valued the improved production and profits which tended to flow from a better accident rate. That's what we mean by *better protection . . . lower cost.*

Why not talk to an AM man yourself, and see what he can do for you? Or ask for names of AM policyholders near you (we'll be glad to send them), so you can judge AM people by their actual achievements. Write American Mutual, Dept. EN-1, Wakefield, Massachusetts.

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American Mutual

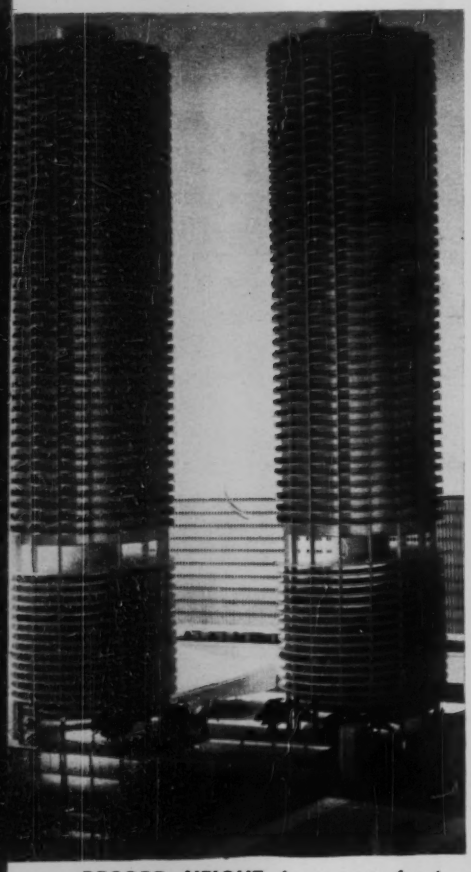
LIABILITY INSURANCE COMPANY

Rising Costs to Spur New Materials,

- **Watch for taller office buildings in both concrete and steel; smaller industrial plants; more experimental architecture.**
- **There will be new applications of concrete and stronger steels. In the office, model studies and computers will speed structural analysis.**

This year will see some strange new things happening in building design and construction—but mostly a continuation of 1960 trends. In particular, look for greater use of new structural steels, cable-supported roofs and thin shells.

There will be a trend to taller office buildings throughout the country. Sixty stories in Chicago, with both steel and concrete framing considered; 46 stories in New York City, for what may be a short-lived record for reinforced concrete; 44 stories in steel for a West-of-the Mississippi record in Houston; and 35 stories—through the old 150-ft 'quake ceiling—in Los Angeles.



RECORD HEIGHT for concrete framing may be set by Chicago apartment houses.

In contrast, industrial buildings in '61 will be smaller than those built in the Fifties, as the number of plants built stays high while the total dollars spent for them stays relatively low. And a higher percentage of the new plants will be for new products—the small, attractive plants sprouting along the superhighways.

Strange designs of exhibit buildings can be expected as U. S. architects and engineers—perhaps vying with top talent from abroad—compete for attention to their exhibitor-clients' buildings to be constructed for the '64 New York World's Fair.

Also, in 1961, analysis of structures will be speeded—by model studies and electronic devices. More and more engineering firms will mechanize computations.

Use of new building materials and new applications of some old materials will be expanded: Composite steel-concrete construction; prestressed concrete in multistory buildings; stronger, more weldable steels in structural shapes and bars; partition materials, some yet to be announced; plastic coatings with unusually long life.

It can be an exciting year of growth and change for building if all these things happen. And happen they will in '61 if the significant trends of '60 continue and the important new techniques continue to develop and gain in application.

Sixty-One, like '60, can be a year of records and accomplishment. Sixty-One can also be marred as was '60—and every year before it—by avoidable structural failures brought on by faulty design, misuse of materials, careless construction and inadequate supervision, inspection or testing.

• **Impact of rising costs**—The significant trends in building design and construction in 1960 were not new ones. They were a continuation of those evident in the latter part of the Fifties but accentuated by existing economic factors—principally rising costs.

Building costs reached record heights. Land prices rose to new levels. Manufacturing costs continued the upward swing. And the cost of engineering services reached an all-time high. These trends increased the pressure on the construction industry to be more efficient, to produce needed buildings more economically.

• **Higher and higher**—Rising land costs probably are the major factor in the continuation of the trend to higher office and apartment buildings.

Design started last year on twin 60-story apartment houses in Chicago, a near record for height in that city. They will rise 583 ft above the ground. Alternate designs are being made in steel and reinforced concrete. If concrete is bid low, these towers will set a new world's height record for concrete. (The present record holder is the Banco do Sao Paulo in Brazil, 507 ft high.) Only the 41-story steel-frame Prudential Building will exceed them in height in Chicago—by 13 ft.

Until these Chicago towers are built, the U. S. record for concrete buildings may be held temporarily by the 46-story Americana Hotel, on which construction started last fall in New York City. That building will rise 420 ft above the ground. The present U. S. record holder is the newly completed, 390-ft-high Bank of Georgia Building in Atlanta.

In Houston, steel is being erected for the tallest office building west of the Mississippi—a 44-story office building for Humble Oil & Refining Co. And a 35-story skyscraper will set a new record for Los Angeles, which had limited buildings to 13 stories until 1958.

New Methods and New Designs

• **Other records**—A lift-slab record was set last year when fifteen slabs were jacked up to form floors and roof of an apartment house in Ann Arbor, Mich. The record was in the number of slabs lifted. Total height, however, was 15 ft short of the record lift—a 160-ft-high, 14-story apartment house in Hallendale, Fla.

A height record was set for prestressed concrete. A building with prestressed framing was erected to a height of 24 stories in the Ala Moana Shopping Center in Hawaii.

Another noteworthy achievement was the erection in Hempstead, N. Y., of a four-story parking garage for 600 automobiles in 70 hours. It was built of standardized, precast, prestressed units. There is strong evidence you will see more of these simple and economical structures built in '61.

A record for composite steel-concrete construction was set in Brooklyn, N. Y. A court house and federal office building erected there is the largest to date with this type of construction. Welded studs on the flanges of the steel floorbeams transfer shear between the beams and concrete floor slabs.

• **Covered arenas**—Another outstanding structure—the Pittsburgh Public Auditorium, with movable dome roof—ran into unusual difficulties near the year's end that delayed completion. Construction workers struck to persuade the Auditorium Authority to discuss awarding of maintenance work to them. However, after about a month they returned to work pending negotiations, and now the auditorium's metal lid is 85% complete.

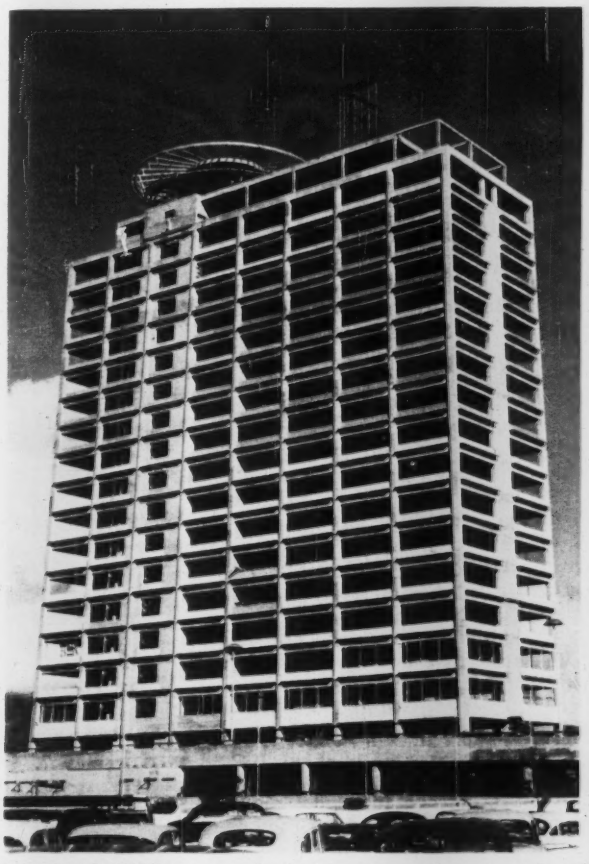
Houston will push plans for a roofed stadium for baseball and football in '61. The dome will be about 180 ft above the playing field and will span about 700 ft.

• **Strange structures**—Some novel buildings were under construction last year. One was a municipal auditorium in Utica, N. Y., with a 240-ft-dia circular roof supported on a dual cable system. The cable arrangement looks like a giant bicycle wheel laid flat. Cables were tensioned to damp out vibrations.

Another unusual building is the Memorial Coliseum built for Portland, Ore. Its 360-ft-square, steel truss roof is supported on only four columns, spaced 240 and 270 ft apart. Inside and clear of this construction is a circular concrete arena bowl 330 ft in diameter.

A new approach to passenger handling makes noteworthy the terminal

OFFICE BUILDING for Humble Oil will be tallest west of the Mississippi.



NEW HEIGHTS were reached with prestressed concrete in an Hawaiian office building.

building at Dulles International Airport under construction in eastern Virginia. The structure will be two-story, with a cable-supported roof that will provide a column-free concourse 150 ft wide and 600 ft long.

It will not have long piers around airplane stations, as do other major terminal buildings. Instead, passengers will be transported to and from aircraft in mobile lounges.

• **Nuclear power plants**—The nuclear power programs of the Atomic Energy Commission and private utilities continue to give designers and contractors opportunities to work on extraordinary structures. The AEC last year started on a ten-year program for development of competitive nuclear power. Different reactor concepts will continue to be developed in '61. Expenditures on this program will average about $230 million per year.

The Yankee Atomic Electric Co. nuclear plant at Rowe, Mass., went on the line last year. Four other major plants will be completed before the end of this year.

• **World's fair buildings**—Seattle's Century 21 World's Fair, scheduled for 1962, created still other opportunities for unusual design and construction. Among the unusual structures are Coliseum Century 21, a structure enclosing nearly four acres of column-free exhibit space; U. S. Science Pavilion; and Century 21 Space Needle, a 550-ft spire topped by a revolving restaurant.

Planning also started last year for the New York World's Fair, scheduled for 1964.

Construction is expected to be mainly multistory, because single exhibitors are being limited to a maximum plot of a little over one acre. To date only an administration building has been erected on the site.

• **Double-curved roofs**—The trend to thin-shell roofs continued unabated in 1960, and it will go right on through '61. Some examples:

• A 150-ft-dia circular lecture room at the University of California is designed with a 2-in.-thick, accordion-pleated domed concrete roof.

• A post office in Providence, R. I., was constructed with a roof consisting of six independent concrete barrel arches, each 150 x 140 ft in plan and 6 in. thick.

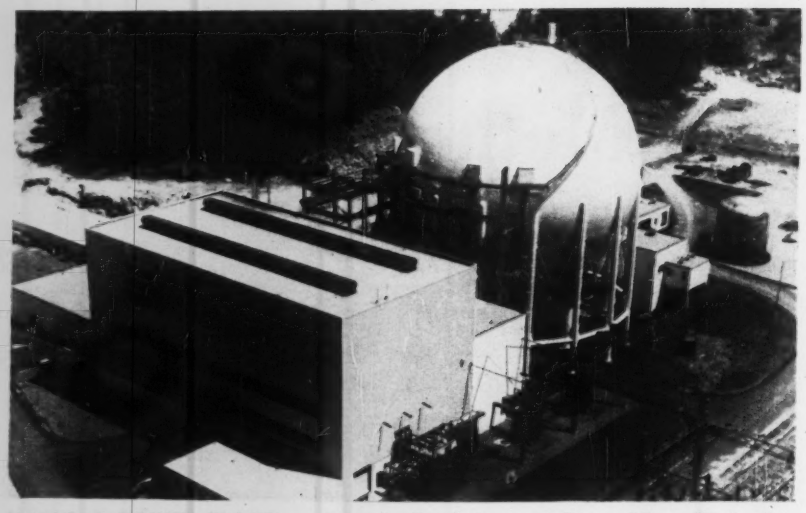
• The terminal building at Metropolitan Oakland (Calif.) International Airport was slated for a roof made of precast concrete hyperbolic-paraboloid units 1,000 sq ft in area.

• Precast barrel arches were used for the roof of two buildings at the San Mateo County (Calif.) Fair and Fiesta; each arch is 98 x 18 ft.

• Precast panels were used to form the folded-plate roof of an 80-ft-dia circular bank building in Dallas.

• Plywood barrel arches were used with precast concrete framing for a roof of a motel near New York City.

• And plywood stressed-skin panels were assembled to form the pleated, peaked roof of a St. Louis church.



NUCLEAR POWER PLANT went on the line last year at Rowe, Mass. Steel sphere 125 ft in diameter houses a pressurized water reactor. Rating is 134,000 kw.

• **Industrial building trends**—Changing economic conditions are making their mark on industrial building design. Rising labor costs will continue to encourage the trend to automation in factories. An ever-increasing flow of new products will result from expenditures on research and development.

Other important factors in the design and construction of industrial buildings in '61 as in '60—will be expansion of the national highway system, new trends in the use of natural resources, changes in the labor force and rising incomes.

All these have led to a step-up in construction of facilities for new products, a shift in the geographic distribution of new industrial building, greater emphasis on smaller attractive plants, and changes in plant design favoring highly efficient production and shipping of new products. And these trends will continue.

In general appearance, 1960 plants followed the trends set in the Fifties. One-story buildings are still preferred for straight, horizontal production lines. But multistory structures are used where gravity flow is desirable. Column spacing usually ranges from 40 to 50 ft, to accommodate large equipment and for flexibility in use of space. Clear height runs from 16 to 18 ft.

• **College construction boom**—Expenditures for college construction last year are estimated to have been about $1 billion. This was double the rate of about five years ago, and the boom will continue for at least ten years.

In '61, new trends in education will be seen bringing about changes in campus planning and building design. Most significant so far have been the construction of different-sized classrooms for different-sized classes, design of different-shaped rooms for different purposes, and preparation for use of new teaching devices, such as tape recorders and TV.

Also, the concept of libraries is changing. The trend is to bring students and all types of stored information closer together, and in line with this trend, classrooms are being incorporated in library buildings.

• **Housing trends**—Many homebuilders were disappointed in housing sales last year. They had expected the boom of the late Fifties to intensify. But starts totaled only about 1,250,000 units, as sales failed to materialize in the volume hoped for—off about 15% from 1959.

Little help came from Congress, which failed to pass an omnibus housing bill, instead took care only of rock-bottom needs: HHFA got $500 million in additional lending authority for college dormitories; the Community Facilities Administration received $50 million for loans to communities that find it difficult to find private financing for waterworks, sewers and gas systems; FHA insurance of home improvement loans, due to expire Oct. 1, was given a one-year lease on life.

The new Congress is almost certain to pass an omnibus housing bill during this session. Look for a continuation

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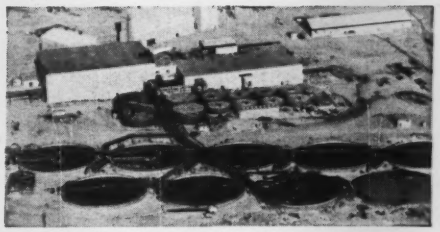

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of measures making it easier for the public to buy houses: Little or no down payment and easier financing of mortgages, perhaps a stretchout of amortization to 35 or 40 years.

One bright spot in 1960 was an increase in availability of mortgage money in many parts of the country where it had been in short supply. However, homebuilders began to realize that financing was not their most important source of trouble. They probably had priced themselves out of the market by continuously "upgrading" their houses.

As a result, many homebuilders entered 1961 with lower priced units. And the search for cost-reduction measures will be intensified throughout the year.

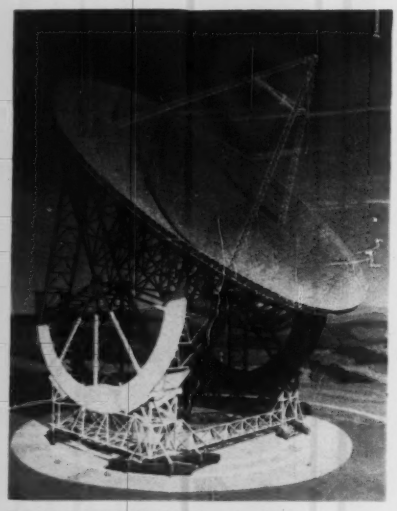
In this direction, the National Association of Home Builders Research Institute's work should soon start paying dividends. The institute, during the past few years, has been erecting several research houses annually to try out new materials and methods. Last year, it developed a new method of drywall construction that should cut costs. Called the SteelFast system, it involves the use of cold-formed, light-gage connectors for attaching wallboard.

• **New steels**—The range of structural materials available to engineers was increased last year by the introduction of new structural steels. Most significant was adoption by the American Society for Testing Materials of a specification —A36-60T—for a steel that is expected to replace the commonly used A7.

The new steel is more weldable and can be used at 10% larger working stresses, because its yield point is 10% higher. Its use will continue to increase.

A trend also appeared to be starting, both in buildings and bridges, toward greater use of low-alloy, high-strength steels. Trials to date seem to prove that longer spans can be attained at less cost with these new steels. Studies made for a 16-story office building at Portland, Ore., show a weight saving on framing with A440 steel (50,000-psi yield point) of more than 250 tons and a cost saving of $25,000.

• **New bolt specs**—The Research Council on Riveted and Bolted Structural Joints approved a new specification for structural joints with ASTM A325 (high-tensile-strength bolts). It was soon endorsed by the American Institute of Steel Construction and the Industrial Fasteners Institute. One of its most important provisions is recognition of the difference in strength of friction-type and bearing-type connections.



RADIO TELESCOPE 600 ft in diameter is being built at Sugar Grove, W. Va.

The new spec maintains an allowable stress of 15,000 psi on the nominal cross section of a high-strength bolt in friction connections, which are useful when slippage is undesirable or fatigue failure is possible.

But for bearing connections, when the threads are outside the bearing area, a higher working stress is permitted. When 20,000 psi is allowed on the net section in tension, 22,000 psi is permissible on the nominal cross section of the bolt in shear. However, when threads are present, stress is limited to 15,000 psi.

The new spec also sets an allowable stress for A325 bolts in tension at 45,000 psi on the nominal area.

In addition, it allows use of three styles of bolts and two styles of nuts. So the same-size bolt head and nut can be used, permitting ironworkers to use only one size of wrench or socket for a specific bolt assembly. And heavy semifinished hexagonal bolt heads and nuts can be used, eliminating the need for washers.

Thus, bolted connections will be more economical than before when the higher stresses can be used. So look for an intensification of the trend to bolts in '61.

• **Failures follow a pattern**—A survey of structural failures that occurred in recent years revealed last year that they are due to much the same mistakes. Failures can be traced usually to one of four types: faulty design practice; oversight in design; faulty construction and faulty bracing.

Changing the design without the knowledge of the original designer is a frequent faulty design practice that leads to failures. Another is poor drafting and insufficient checking of drawings. Still another source of trouble is failure of designers to inspect the field work.

Design oversights that recur frequently include inadequate attention to thermal effects, insufficient bearing on supports, short reinforcing steel in concrete members or badly placed laps, and omission of shear and flexure reinforcing from beams. Faulty construction practices include too many openings in members for pipes and ducts, completion of frame erection without permanent connections or installation of floor systems, and inadequate bracing.

Collapse of a building under construction in Los Angeles last year was attributed to failure of a workman to reweld a temporary weld. The joint connected longitudinal sway bracing to a girder. Lack of bracing was the probable cause of the collapse of a concrete floor in an apartment house being built in Arlington, Va., and may have been responsible for a shoring failure in the new Smithsonian Institute Museum in Washington, D. C. And inadequate bearing on columns was blamed for the collpase of the precast concrete framework for an industrial building near Harrisonburg, Va.

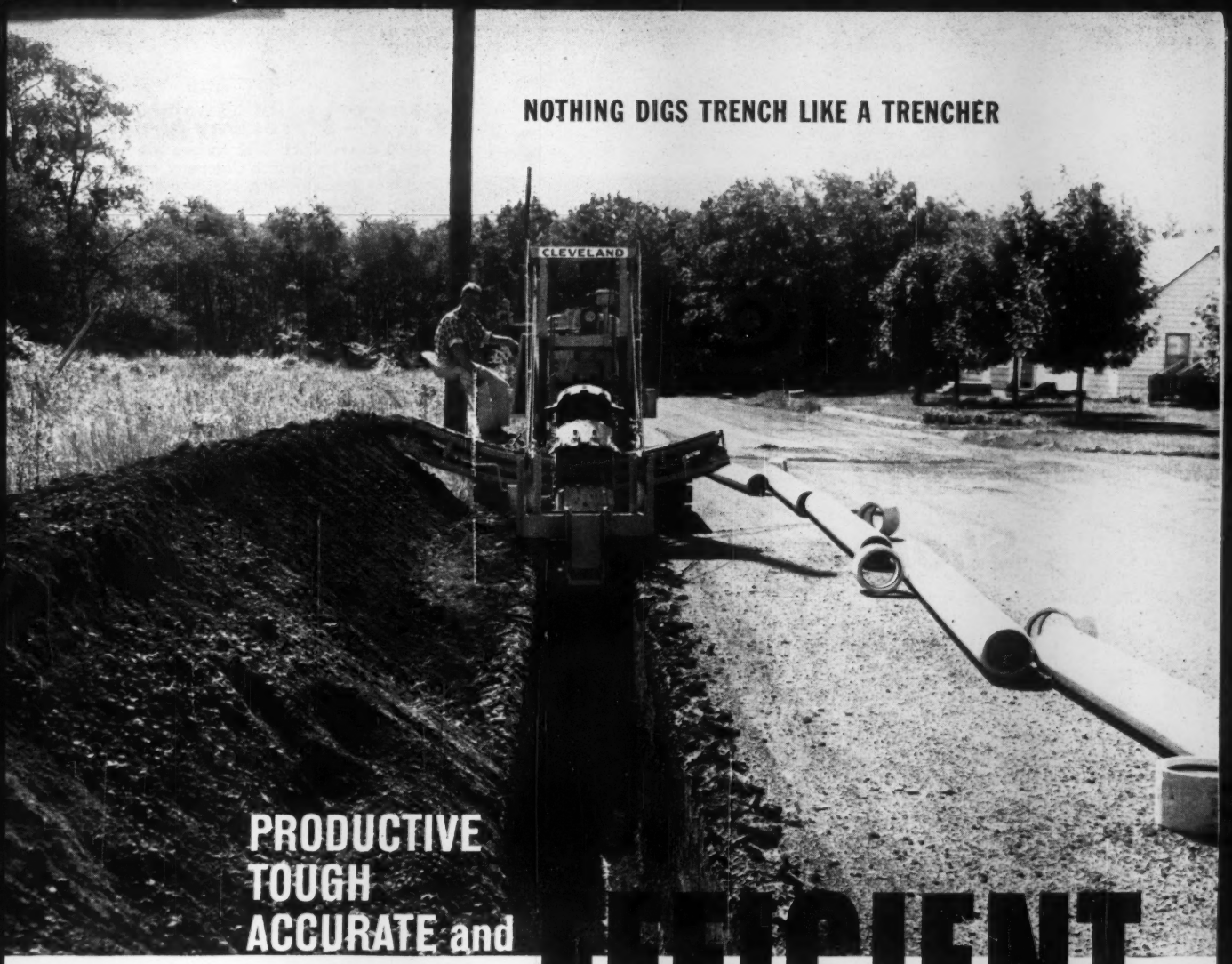
Whether designers and builders in '61 will have learned enough from the failures of '60 to prevent their recurrence, only time will tell.

• **Second-generation computers**—Engineering firms increasingly are using high-speed electronic computers in building design. Further encouragement in this direction was given by the introduction last year of improved models —in effect, a second generation.

These high-speed machines utilizing transistors instead of tubes, relieve engineers of routine calculations, enable them to make computations that would be prohibitively costly if done manually and permit greater accuracy.

The new computers were designed for fast and easy input of data and instructions. The instructions may be in a code based on ordinary English and mathematical terms. The machines store information in medium or fast-access memories. Control units cause operations to proceed automatically in a sequence dictated by a stored program. And the results are typed or printed out at high speeds.

To use a computer effectively, a firm must organize itself specifically for the purpose. And the type of organization to be adopted depends on the capabilities of the staff and the type of computer selected. As a result, the computers are changing engineering office practices.



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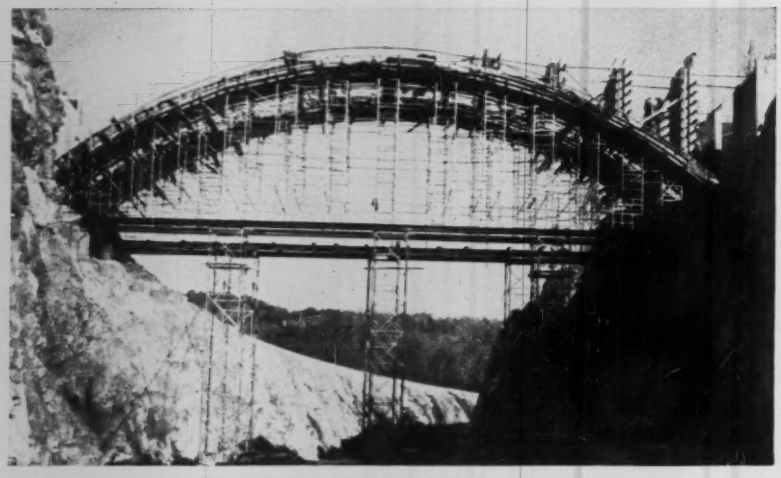
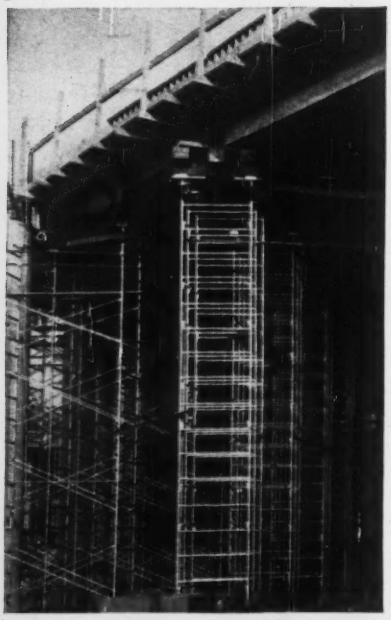


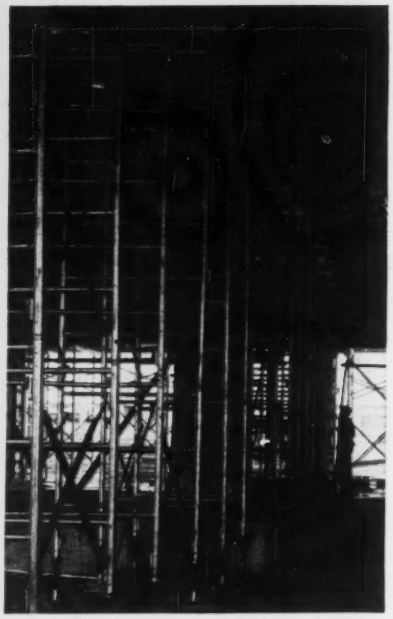
. . . 8'-wide ribbon arches

For the 143'-long concrete bridge at Hogback Dam, Riverton, Conn., PS Co.'s new 4'-wide 20K heavy duty frames (designed to safely carry 10,000 lbs. on each leg) of "Trouble Saver"® Sectional Steel Shoring are quickly erected and spaced atop long I-beams to support 9,000 lbs. per leg imposed by columns and two ribbon arches 8'-wide by 1½' to 3'-thick, 34' center height. This shoring is supported by six 48'-high towers of PS Co.'s Extra Heavy Duty Shoring, which carries a total load of 32,000 lbs. per leg. White Oak Excavators, contractor.

. . . 4'—5' Freeway girders

13,900 heavy duty 20K frames are now being used by Griffith Company, contractor, to support the heavy concrete box girder design of the six-mile Santa Monica viaduct connection, 15' to 33' high, to a Los Angeles Freeway. Bottom slab of box girders is 5½" x 6½" thick; top 5" to 5½" thick. Box depth is 4' to 5', made in three pours.





. . . 12¾" grid-type slabs

Here, 20K heavy duty frames are spaced 3'11" apart to support horizontal shoring for grid-type floor slabs. Floors in this 11-story Florida National Bank Building, Jacksonville, are 12¾"-thick. 20K frames are also used to shore heavy spandrel beams on the second floor only. George A. Fuller Co., contractor.

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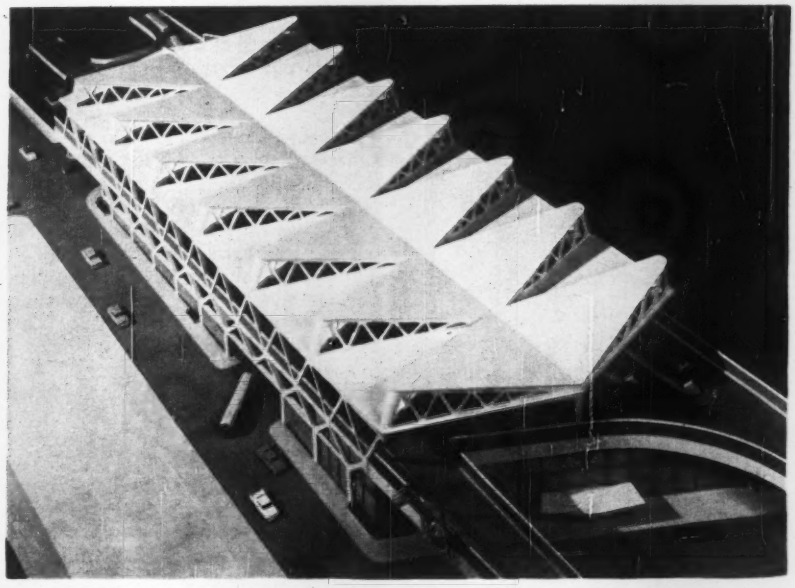


BUS TERMINAL in New York City has precast concrete roof. The 3-level structure straddles a depressed expressway linking with lower-deck roadway at George Washington Bridge.

New England

• **Office-research center** – Technology Square—a $15-million office-research center providing 800,000 sq ft of floor space—is under way in Cambridge, Mass. A 16-story building will dominate the 14½-acre complex. Demolition was 95% completed in 1960.

• **Power project**—Yankee Atomic Electric Co.'s 134,000-kw nuclear power plant at Rowe, Mass., was completed last year. The pressurized water reactor is housed in a 125-ft-dia steel sphere. The project cost $50 million.

• **Prudential Center**—The $100-million Prudential Center project is under construction on a 31-acre site in Boston, Mass. The complex will be dominated by the 52-story Prudential Tower building, which will be sheathed in colored structural glass. At the foot of the tower, seven low commercial buildings will be erected. The center will house business, civic and residential enterprises.

• **Automated post office**—A $20-million post office with the nation's first automatic mail-handling system was completed last year in Providence, R. I. Six bays roofed with concrete barrel arches cover the building.

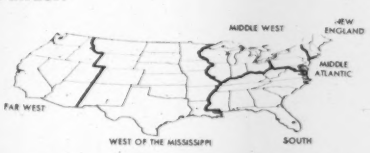
• **Charles River Park**—An urban-renewal project to cost more than $55 million, is under way on a 48-acre site in Boston, Mass. One area now under construction will include a 16-story, a 23-story and two three-story apartment houses.

Middle Atlantic

• **Apartment project**—Lefrak City, a $125-million apartment complex on a 40-acre site in Forest Hills, N. Y., was started last year. It will feature twenty 18-story buildings, a shopping center, five swimming pools and park areas. Completion is scheduled for 1963.

• **Manhattan bank**—Chase Manhattan Bank's $135-million, 60-story office building is being constructed in New York City's financial district. The structure has a steel frame and aluminum and glass curtain walls. It will stand on a 2½-acre open plaza. Final completion is scheduled for 1962.

• **Nuclear generating station**—The $100-million nuclear electric generating station at Indian Point, N. Y., was 90% completed in 1960. It is scheduled to go into operation this fall. The station will have an electric generating capacity of 275,000 kw. Consolidated Edison Co. of New York, Inc., is the owner-builder.



The regional breakdown

• **Pan Am Building**—Foundations are being constructed for the $100-million building behind New York City's Grand Central Station. The 59-story, octagonal structure will straddle existing railroad tracks and will cover 3½ acres. Plans call for erection of the tower's frame concurrently with demolition of an existing six-story building on the site.

• **New York City hotel**—A 45-story 2,150-room hotel for Hilton Hotel Corp., the largest to be built in New York City in the last 30 years, is under way in mid-Manhattan. Its estimated value is $75 million. Completion is scheduled for 1963.

• **Midtown plaza**—Demolition is almost completed for a $25-million shopping development in downtown Rochester, N. Y. The development will be centered around a two-story pedestrian shopping mall, completely enclosed by roofs and skylights and air conditioned all year 'round. It will contain nearly a million sq ft of floor area, housing some 60 new shops, two department stores and a bank upon its 1962 completion.

• **Manhattan motel**—Foundations are being cast for River View Motor Hotel, New York's $10-million in-city motel. The 20-story structure will have a four-level 350-car garage. Completion is scheduled for this year.

• **Redevelopment project**—Washington Square East, a $55-million residential redevelopment project including six apartment buildings, is under way in Philadelphia. Construction began last year on the 33-story Hopkinson House Apartments. The other five buildings, each 30 stories high, are scheduled for construction early this year.

• **Manhattan hotel**—Excavation began last year in New York City for the Americana Hotel. It will be reinforced concrete and rise to a record 420 ft above grade. The 2,000-room hotel will have a 46-story tower and a 24-story wing. It will be completed in 1962.

• **Federal building**—A federal court house and office building—the largest structure of composite construction ever built—is under way in Brooklyn, N. Y. The $16-million project includes a seven-story court house and four-story federal office building joined together at grade with a high-ceiling entrance and lobby three stories high. Erection of the court house and the foundations for the office building were completed last year.

. . . Major Building Projects

• **New York City office building**—The home office building of Equitable Life Assurance Society will cost $55 million when completed this year. The structure, sheathed in aluminum and structural glass panels, will feature a 42-story tower with a 16-story annex. It is reported to be the largest single-occupancy office building in the U. S. with 1.7 million sq ft of office space.

• **Rochester civic center**—Construction is under way on a $50-million civic-center in Rochester, N. Y. It will include office, courts and public safety buildings.

• **Union Carbide headquarters**—The $46-million home office building of Union Carbide Corp. was completed last year on Park Ave. in New York City. The exterior features natural stainless steel mullions, black-coated stainless steel spandrels and gray-tinted glass. Three-quarters of the 52-story office building sits over the tracks of Grand Central Terminal.

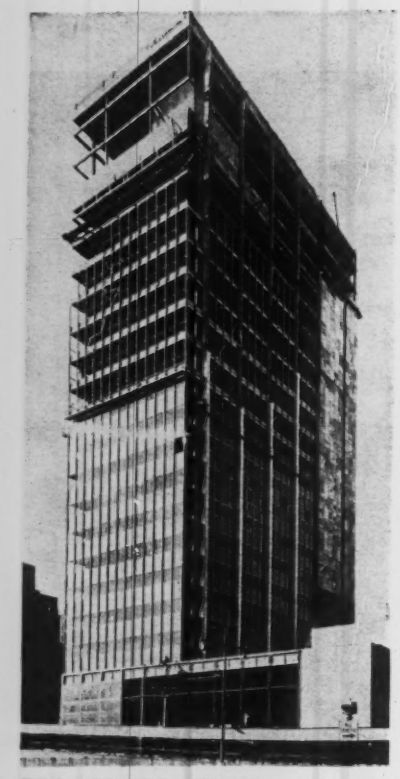
• **Building complex**—The Prudential Insurance Co. of America is building a $27.6-million building complex in Newark, N. J. The buildings will have marble exterior walls with granite trim. The 24-story Prudential Plaza Building and one seven-story wing were completed last year. A second wing is scheduled for completion this year. The other building in the complex will have one seven-story and one six-story wing.

• **Apartment development**—Kips Bay Plaza, a $22-million apartment development in Manhattan, is nearing completion. The two 21-story structures on a 10-acre site will contain 1,100 apartments.

• **New York office building**—Construction is under way on a 43-story, $75-million office building which will add 1.7 million sq ft of rentable space to the Rockefeller Center area when completed in 1962. The builders-owners of the structure are Uris Buildings Corp. and Rockefeller Center, Inc.

• **Power plant**—A $110-million power plant was dedicated last year on a 110-acre site at the north end of the New Jersey Turnpike. It has two turbines, each producing 290,000 kw. Public Service Electric and Gas Co. is the owner.

• **Park West Village**—A $35-million redevelopment project, consisting of seven 20-story buildings on a 15½-acre site, is nearing completion in Manhattan. Three buildings are already occupied and the final four are scheduled for completion this spring.



ENGINEERING CENTER in New York City has a welded steel frame.

• **New York City bank addition**—The Morgan Guaranty Trust Co. is adding 12 stories atop an existing 11-story office building. The original steel-frame structure was built in 1896. The added stories will increase floor area by 75%, to 450,000 sq ft and will cost $13.5 million, plus land, and will be completed this year.

• **Apartment center**—Colonnade Park, an $18-million apartment center in Newark, N. J., was completed last year. The 30-acre project consists of twin buildings and one larger structure, all of which have 22 stories.

• **Pittsburgh auditorium**—Pittsburgh's Public Auditorium with its movable domed roof will cost $15 million when completed this year. The stainless steel dome is 415 ft in diameter and weighs 1,350 tons. It is composed of six movable and two fixed sections.

• **Bus station**—Foundations were built last year for the $13-million George Washington Bridge Bus Station in New York City. The three-level structure will feature a precast concrete roof made of 26 triangular sections. Completion is scheduled for mid-1962.

• **Concrete building**—The $4.3 million Police Administration Building, under construction in Philadelphia, will be a precast-concrete, five-story structure when completed in 1962. Three circular elements of 50-ft radius form the basic layout of two wings and a central core.

• **Lincoln Center**—New York City's Lincoln Center for the Performing Arts will include the Metropolitan Opera House, the Repertory Theater and Library-Museum, the Julliard School of Music, Philharmonic Hall and the Theater for the Dance when completed in 1964. A housing development and a unit of Fordham University will also be on the 11-acre site.

• **Washington building**—The $66-million Third House Office building is under construction in Washington, D. C. The nine-story, steel-frame structure will have a three-level underground garage for 1,600 to 1,800 cars, a basement and sub-basement. The gross floor area will be 2.37 million sq ft. Completion is scheduled for 1963.

• **GSA projects**—Four building projects with a total value of $110.5 million are under construction in Washington, D. C. They are the $36-million Smithsonian Museum of History and Technology, 30% completed; three Federal Office Building projects, just getting under way: $41-million building No. 10 (consisting of two structures); $16.8-million building No. 9 and $16.7-million building No. 8. Last year the $49-million State Department Building was completed.

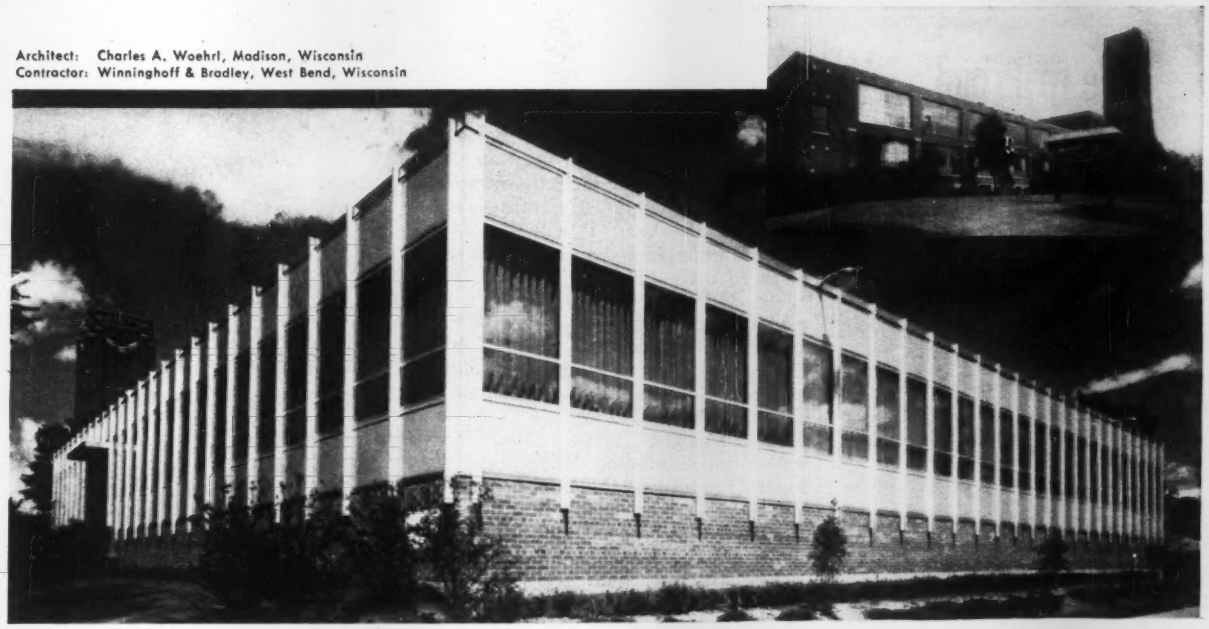
South

• **Government structures**—The Central Intelligence Agency's headquarters in Langley, Va., will cost $46 million when completed this year. The 8-story structure has an adjoining arch-roofed cafeteria.

• **TVA steam plants**—Construction is under way on three TVA steam plants in the South. The $189-million Paradise Steam Plant in Kentucky, will have two 650-megawatt units when completed in 1963. Two additions to the Widows Creek Steam Plant in Alabama—one completed last year and the other scheduled for a 1963 completion—will cost $141 million. Colbert Steam Plant in Alabama will have its fifth unit completed in 1962. It will cost $70 million and will bring the total plant capacity to 1,300 megawatts.

• **Glass plant**—The expansion program for the Ford Motor Co.'s glass plant at Nashville, Tenn., reported to cost

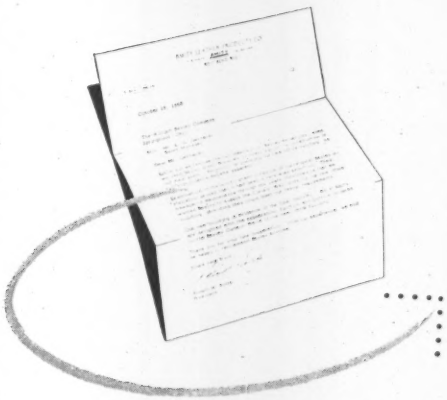
Architect: Charles A. Woehrl, Madison, Wisconsin
Contractor: Winninghoff & Bradley, West Bend, Wisconsin



33 years of reliable performance convinced AMITY LEATHER that their new office building should have a —

Bayley

Curtain-Wall System



• Amity Leather Products Company, West Bend, Wisconsin, manufactures the world-famous Amity and Rolf Lines of personal leather goods. Sponsoring "quality" in every phase of their endeavor for the past forty years, they found in Bayley a supplier with comparable standards of quality and service.

Report in user's own words —

"Little did we realize the full meaning of 'Bayley Reliability' when we used Bayley Steel Windows 33 years ago in the construction of our main plant. Recently, in planning our new office building, its full significance became apparent.

"Examination of the current good condition of our original Bayley installation proved that it had been a very wise selection. Freedom from window maintenance through the years convinced us that we wanted Bayley to supply the Curtain-Wall units for our new office building, providing they could meet our design requirements.

"Our new building is evidence of the final outcome. We at Amity are delighted with the appearance, function and service rendered on the Bayley Curtain-Wall of our new office building.

"Thank you for your fine cooperation. From our experience, we will be happy to recommend Bayley anytime."

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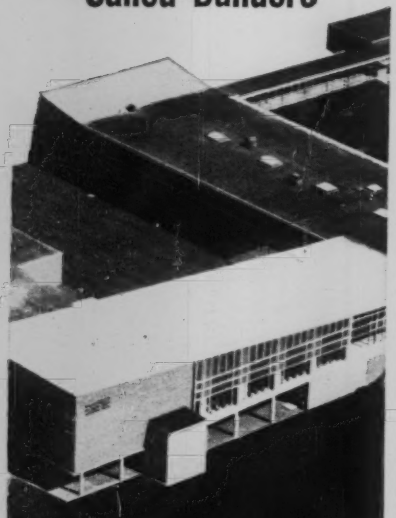

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. . . Major Building Projects

$20 million, is two-thirds complete. The expansion will add 274,000 sq ft, and will double production capacity.

• **Georgia bank**—The 31-story Bank of Georgia Building, under way in Atlanta, will be one of the nation's taller reinforced concrete structures when completed this year. It will rise 366.6 ft above ground. Exterior columns will be faced with aluminum.

• **Merchandise Mart**—Atlanta's Merchandise Mart is scheduled for completion this year. The $15-million structure will be 23 stories high and contain 1 million sq ft of floor area.

• **Newspaper building**—Steelwork is going up for the $18-million Miami Herald Building on a 10-acre site between the McArthur and Venetian causeways to Miami Beach. The four-story, 631x220-ft structure, built on 3,600 piles will be completed in 1962.

• **Southern steam plant**—Southern Electric Generating Co.'s #1 Steam Plant near Wilsonville, Ala., will cost $142 million when completed in 1962. $95 million has been spent on the plant and substation since the start of the project in 1957.

• **Veterans Hospital**—A $17-million Veterans Hospital, scheduled for completion in 1962, is under way in Nashville, Tenn. The reinforced concrete foundation was 99% completed last year.

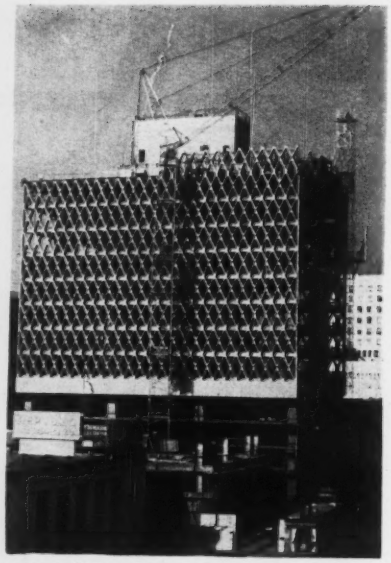
Middle West

• **Civic center**—Detroit's $54-million civic center—including Cobo Hall and the Convention Arena—is nearing completion. Cobo Hall, a three-level circular building, costing $46 million, was completed last year. The $8-million Convention Arena, scheduled for completion this April, will have a maximum seating capacity of 14,000 and will have foyers connecting to Cobo Hall.

• **Marina City**—Ground was broken last fall for Marina City, a $36-million project in Chicago. It will feature twin, circular, 60-story, 555-ft-high apartment buildings of reinforced concrete construction with 14 floors of automobile parking. Completion is scheduled for mid-1962.

• **Detroit office building**—The $20-million Michigan Consolidated Gas Co. 30-story office building is under way in Detroit. Completion is scheduled for 1962.

• **Atomic plant**—The $75-million Enrico Fermi atomic power plant near Detroit was completed last November, except for the reactor. Final construction is halted because of litigation. There is a total of 14 buildings on a 1,500-acre site.



X-FRAMES of concrete form facade of Los Angeles office building.

• **Chicago's exposition center**—McCormick Hall, a $35-million exposition center in Chicago, was completed in 1960. The 1,110x360-ft, four-level structure has 320,000 sq ft of exhibition space. It also contains a 5,000-seat auditorium.

• **Westinghouse plant**—Construction began late last year on a $25-million power transformer plant for Westinghouse Electric Co., on a 300-acre site in Muncie, Ind. The T-shaped structure will be more than 1,500 ft across the front and the leg of the "T" will be almost 900 ft long.

• **Electric generating stations**—The Consumers Power Co. of Jackson, Mich., is constructing two electric generating stations at the cost of $75 million each. Both stations will contain two 265,000 kw generating units and will be completed this year.

• **Post office building**—A five-story mail-handling building with an attached 10-story office building was completed last year in downtown Detroit by the U.S. Post Office Department. The $23-million structure is on a 7-acre site.

• **Office building addition**—Contracts were awarded last fall for the Continental Companies' $15-million office building addition in Chicago. The 22-story structure will provide 600,000 sq ft of

(*Continued p.* 68)

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Ease of operation, positive control, convenience — for years these and other operator suggestions have been a major factor in the design of Huber-Warco motor graders. A prime example is Huber-Warco's complete Hydraulic Control System. It eliminates fatigue, gives the operator instant positive power, allows him to operate two or more controls (all within easy reach) at once. Hydraulic power means no shoving or tugging at controls, no fear of levers kicking out of position since any cylinder can be locked in any desired position. Finer control of both heavy and the finest finish grading is assured. Best of all, Hydraulic Control develops the skill and confidence so necessary for big production. See the Hydraulic Controls as well as the other outstanding features you get in Huber-Warco motor graders and check Huber-Warco's full line of 3-wheel and tandem rollers, and maintainers at your Huber-Warco distributors soon.

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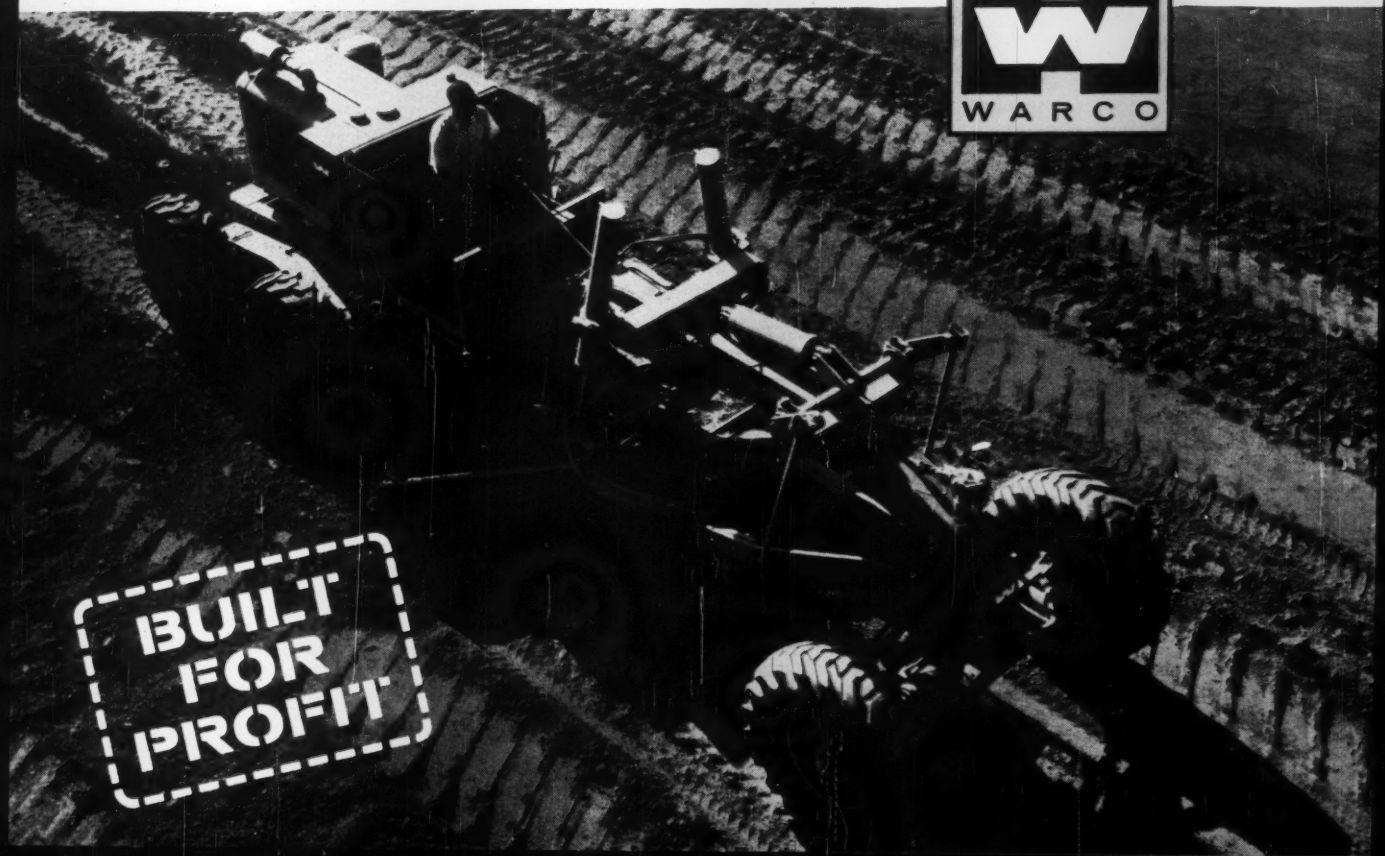


floor area. Occupancy is scheduled for early 1962.

• **Federal building**—A 30-story U.S. Courthouse and Federal Office Building will be constructed in Chicago for $35 million. A contract for site clearing was awarded in December, and the general contract for the structure is scheduled to be awarded in 1962.

• **Nuclear power station**—Construction started last year on Big Rock Point Nuclear Power Station near Charlevoix, Mich. The $27-million project will have an initial capacity of 50,000 kw. Completion is scheduled for 1962.

• **County hospital**—Wayne County Hospital in Michigan was 85% completed last year. The 7-story structure, with four wings, will cost nearly $15 million.

• **Illinois assembly hall**—The 16,000-seat Assembly Hall at the University of Illinois is under construction, and is scheduled for completion by September 1962. It features a folded-plate roof supported on a 400-ft dia post-tensioned concrete ring beam, and will cost $7.5 million.

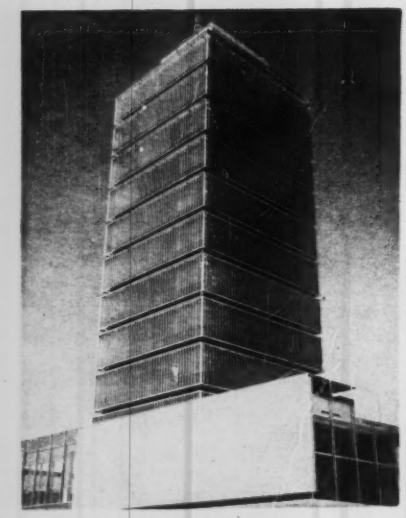
West of Mississippi

• **Dallas center**—Exchange Park, a $250-million project, is rising on a 120-acre site in Dallas. It will feature several multi-story office buildings, a 320,000 sq ft department store, a 1,000-room hotel, a medical center, apartments and retail shops.

• **Amusement park**—Construction began late last year on Texas Under Six Flags, an amusement park on a 105-acre site between Dallas and Fort Worth. It will feature areas typical of the Spanish, Mexican, French, Texas Republican, Confederate and modern American days. The project, scheduled for completion this August, will cost $10 million, excluding cost of land.

• **Houston center**—Foundation work is under way for the first office structure of the $100-million Cullen Center in Houston, Texas. This building will be 21 stories high and will have concrete curtain walls. Other structures will be the 250-room Hotel America, office buildings and apartment towers.

• **Industrial plant**—Western Electric Co.'s $25-million electronic-equipment manufacturing plant in Lee's Summit, Mo., is 50% completed. The plant will include four major buildings, and will provide more than 1.3-million sq ft of manufacturing space. Completion is scheduled for 1961.



CONTROL TOWER 172 ft high, at Los Angeles airport, is screened by aluminum louvers.

• **Houston building**—A $32-million office building for Humble Oil and Refining Co. is under way in Houston, Texas. The 44-story structure will be the tallest building west of the Mississippi. There will be a 1,300-car garage building on an adjoining block. Steelwork was 95% completed in 1960.

• **Houston bank**—The $20-million First City National Bank Building in Houston was 95% completed last year. The 32-story building contains 900,000 sq ft of space. Its facade is glass curtain wall.

• **Office building-hotel**—Framework is going up for Houston's Lincoln Liberty Building, which includes the Sheraton-Lincoln Hotel. The 28-story structure will devote eight stories for office space and 28 stories for hotel functions. It will cost $15 million when completed in 1962.

• **Wichita Plaza**—The tallest building in Kansas, the $9.5-million Wichita Plaza, is now under construction. The 19-story structure will house a 500-car garage, a 140-room hotel and 10 floors of office space. A 1962 completion is scheduled.

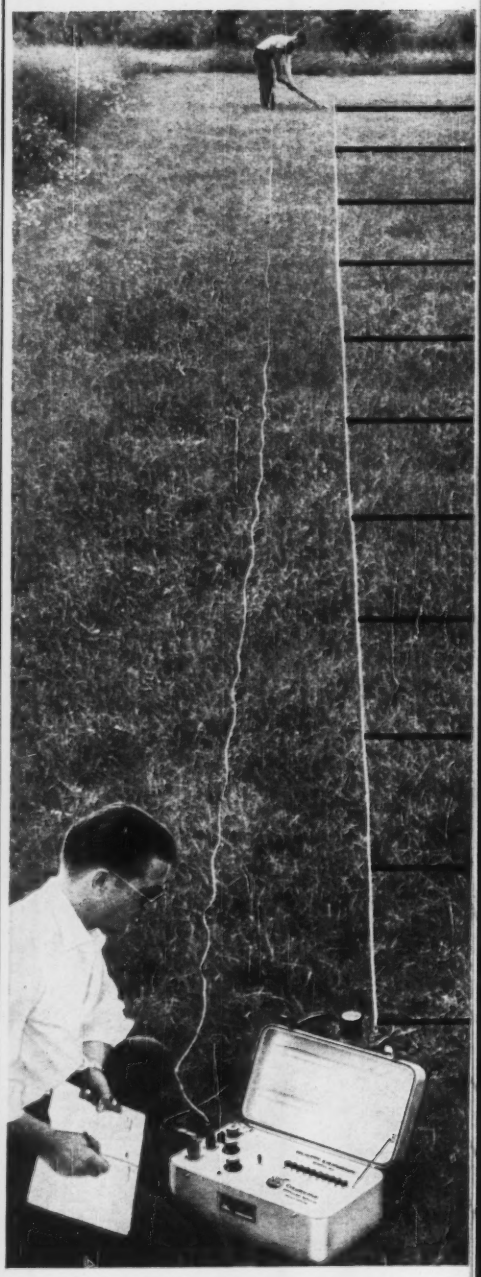
Far West

Atomic reactor—A $145-million plutonium-production reactor is being built for the U.S. Atomic Energy Commission at Hanford Works near Richland, Wash. The plant will produce special nuclear materials when completed in 1962. The project features a steel-plate containment vessel, 80 ft in diameter 125 ft high.

SUBSURFACE EXPLORATION

Dirtmovers: Profit by complete, accurate pre-bid information on presence or absence of bedrock in cut areas and depth to bedrock; establish quantities and types of materials to be excavated; locate suitable borrow pits and location of water table; determine rippability of materials; aid scheduling of equipment during excavation work.

HOW YOU



Paving Contractors: Profit by establishing gravel deposits, volume and type, nearest to the work site.

Consulting Engineers: Profit by predesign subsurface information for buildings, bridges and highways.

Highway Engineers: Establish presence or absence of rock for highway design work; pre-bid classification of materials, volume of materials, subsurface structures.

Architects: Establish stability of subsurface materials and depths for all planning.

Quarry Producers: Profit by accurate information of location and size of aggregate deposits, amount of overburden.

Mining Engineers: For example; locate pre-glacial stream channels for placer exploration, determine bedrock depths.

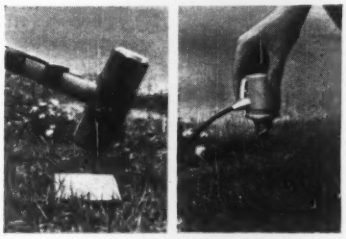
Bridge Builders: Economically establish stability of subsurface structure for foundations.

PROFIT WITH THE MD-1...

Today's profit squeeze and intense competition in the engineering and construction industry can make the MD-1 Engineering Seismograph the most important cost-saving tool you own.

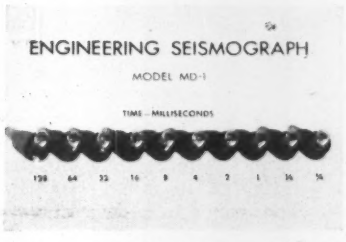
Why? Because daily throughout the world, MD-1 analyses of subsurface material conditions are being quickly converted into profits in the many ways listed above. Yet this vital tool requires no specialized training to operate. It develops accurate, reliable information in the simple manner shown here:

HAMMER PLUS GEOPHONE



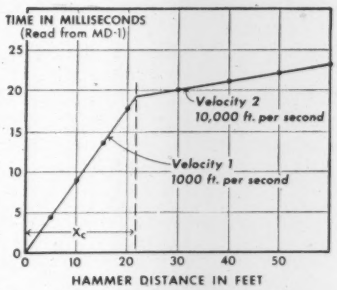
A sledge hammer is struck against a metal plate at known distances from the MD-1. As blow is struck, a switch closes on the hammer, starting the MD-1's electronic counter. The sound waves initiated by the blow are picked up by a geophone, also connected to the MD-1. The time of travel of the *first* or fastest sound wave to reach the geophone is read directly from the MD-1's electronic counter lights.

ELECTRONIC COUNTER



This travel time is determined by the depth and type of the material; the denser the material, the faster the sound waves travel.

PLOTTING MD-1 READINGS



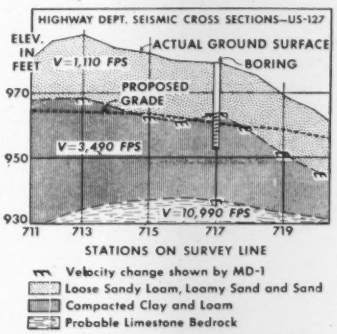
Recorded travel times are plotted on a graph. This time-distance curve represents the velocities of the materials encountered. These velocities indicate the types of materials and each break in the curve indicates a change in material.

DEPTH EQUATION

$$D = \frac{Xc}{2}\sqrt{\frac{V_2 - V_1}{V_2 + V_1}}$$

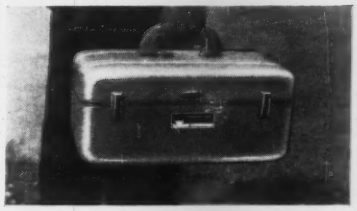
Using the above formula, the depth to denser materials or bedrock is provided. D is the depth, X_c is the hammer distance at which the velocity change occurs, V_1 is the velocity of the top material, and V_2 is the velocity of the second material. Depths to deeper layers are determined the same way.

SUBSURFACE PROFILE



The depths and materials are then marked on a profile map of the job so that subsurface conditions will be considered in the planning and bidding of the work.

PORTABILITY



Because of its small size and light weight, the MD-1 can easily be used in areas inaccessible to drilling rigs. Also important, boulder strewn soils do not impair accuracy of findings as sometimes occurs with probing devices. Where rippability is a factor, a table of velocities for rippable rock has been prepared by the Caterpillar Tractor Co. for use with the MD-1.

The reliability and dependability of the MD-1 is user proved over a number of years on thousands of jobs by operators all over the world.

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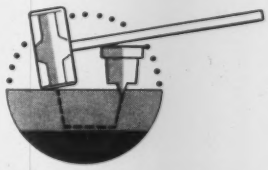
U. S. Corps of Engineers
DuPont



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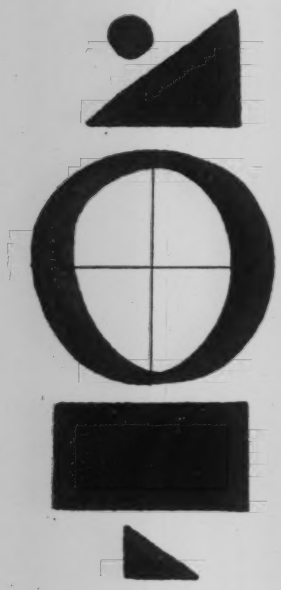
DOWN TO FUNDAMENTALS



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. . . Major Building Projects

• **Dodger stadium**—Initial excavation for the $16-million Los Angeles Dodgers' Baseball Stadium began in 1959, but construction was held up until last fall due to zoning restrictions.

• **Century City**—Webb & Knapp, Inc. and Alcoa are developing 176 acres of Twentieth-Century Fox Film Corp.'s movie lot into a community of 56 apartment houses, four office buildings, a shopping center, a hotel, a theater, an auditorium and a motion-picture museum. The first construction contracts for the $500-million project were let last fall. Total completion: 1975.

• **Technology center**—Groundbreaking began in December for the $25-million first phase of the Space Research and Engineering Center in Redondo Beach, Calif. This phase of the complex consisting of 10 structures will occupy 70 acres of the 110-acre tract.

• **Los Angeles plaza**—Structural steel is going up for Barrington Plaza, a $20-million complex in Los Angeles. When completed in 1962, it will include three apartment buildings—one 26 stories, the others 17 stories—one two-story office building and one two-level underground garage.

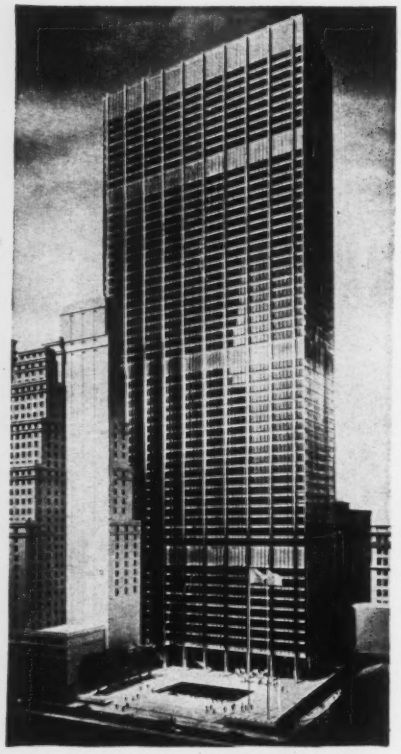
• **Hawaiian refinery**—Standard Oil Company of California is constructing a refinery on Oahu, Hawaii, with a capacity of 32,000 bbl a day. The $65-million project includes 72 tanks with a total capacity of 3,400,000 bbl. The first phase was completed late last year; total completion is scheduled for 1962.

• **Los Angeles Civic Center**—Work progressed on the $350-million, 18-building Los Angeles Civic Center. During 1960, the $25-million County Hall of Administration building and the $9.5-million State Office Building were completed. The nine-story $11.5-million County Hall of Records is scheduled for completion this year.

• **Mammoth resort**—The first homes were completed last year in Hawaii Kai, a $350-million resort community for 50,000 persons near Honolulu. Major areas are to be completed by 1964.

• **Power plant**—The first unit of the eight-unit South Bay Power Plant in San Diego, Calif., was completed last year. Each of the units will have 142,000-kw capacity. The project is estimated to cost $150 million.

• **Redevelopment projects**—The San Francisco Redevelopment Agency has three major projects under way—Golden Gateway, Diamond Heights and Western Addition. The total gross cost including land will be $59.6 million and more than $160 million will be spent in private construction.



CHASE MANHATTAN BANK adds 60 stories to New York's skyline.

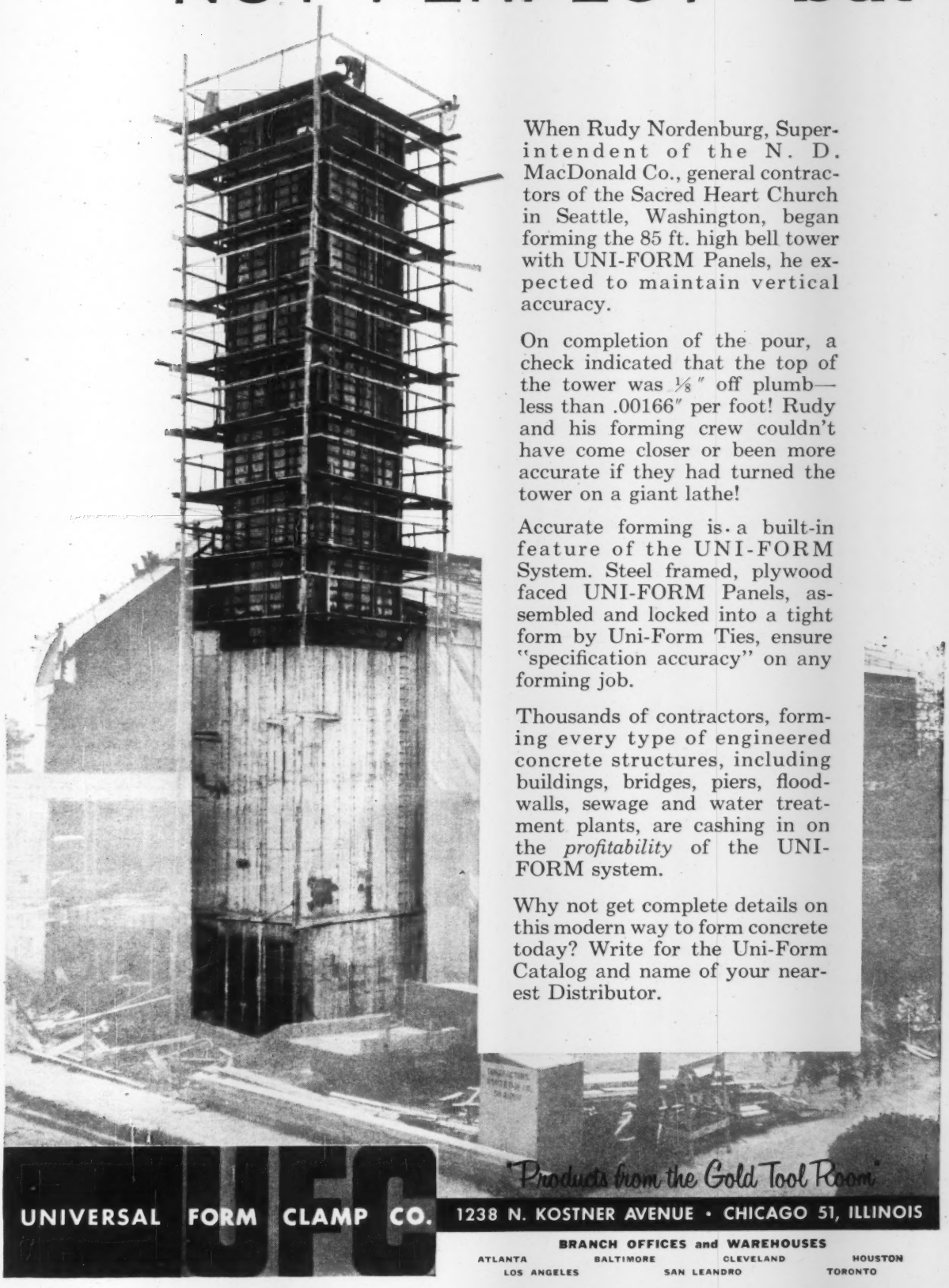
• **Naval air station**—Lemoore Naval Air Station in Kings and Fresno Counties, Calif., will cost $86.7 million when completed in 1962. Last year, contracts totalling more than $28 million were awarded. The station, on a 32,000-acre site, will have a 110-ft high control tower.

• **Kaiser Center**—A $45-million building complex in Oakland, Calif., was completed last year. Kaiser Center features a 28-story structure which has a 390-ft high curved tower and 1.6-million sq ft gross floor area. Other structures on the seven-acre site are a three-story department store and a five-story 1,200-car garage.

• **California State buildings**—California's state building program in 1960 totaled $115 million, and plans have been announced for $111 million worth of work in 1961. Major work will include college classroom buildings.

• **Steam plants**—Construction got under way last year for two Southern Cali-

NOT PERFECT—**but**



When Rudy Nordenburg, Superintendent of the N. D. MacDonald Co., general contractors of the Sacred Heart Church in Seattle, Washington, began forming the 85 ft. high bell tower with UNI-FORM Panels, he expected to maintain vertical accuracy.

On completion of the pour, a check indicated that the top of the tower was ⅛" off plumb—less than .00166" per foot! Rudy and his forming crew couldn't have come closer or been more accurate if they had turned the tower on a giant lathe!

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- Cannot scale, blister, crack or peel
- IRONITE WATERPROOFING cannot be removed without the destruction of the underlying surface
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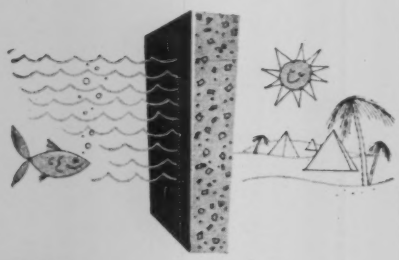

2 *reliable application*

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fornia Edison Co. steam plants. The third and fourth units of the $112-million Huntington Beach steam station was started. Each unit will have 210,000 kw. Work also began on two additional units for the Alameda steam plant near Long Beach, Calif. Each unit will have 310,000 kw. Both projects are scheduled for 1962 completion.

• **Seattle exposition**—Century 21 Exposition, a science fair ground in Seattle, Wash., is scheduled for completion in 1962. Public structures on the 74-acre site will cost $29 million. The $4-million Coliseum Century 21, a clear-span tri-level exposition pavilion, was one-third completed in 1960.

• **Jet airport**—Sixteen buildings will be added to the Los Angeles International Airport, when the $50-million expansion program is completed. The control tower and administration buildings, the central service building and the utility building were completed last year. First carrier operations are scheduled for this June.

• **Power plant**—Construction began last April on the $63-million Haynes Steam Power Plant near Seal Beach, Calif. The first unit will have a 230,000-kw capacity, and is scheduled for operation by 1963.

• **Hall of Justice**—The $15.5-million Hall of Justice for the City and County of San Francisco was 75% completed last year. The seven-story building will contain 580,000 sq ft of floor area for courtrooms, traffic-control offices, jails and police department.

• **Hawaii airport**—A terminal for international operations was completed last year at Honolulu's $23-million jet airport. The overseas terminal complex, with an 11-story main building, is scheduled for completion this year.

• **Federal building** – Contracts were awarded last November for a $45-million federal office building in San Francisco. The structure will have 20 stories plus a penthouse for mechanical equipment and will enclose 1 million sq ft of office space. Completion: 1963.

• **College development**—California Institute of Technology in Pasadena is continuing its $20-million building development. Since the start of the project in 1958, nine of the proposed 18 buildings have been completed. In 1960, construction for four structures got underway, and work is scheduled to start early this year on three other buildings.

• **Commercial center**—The Wilshire-Beverly Centre in Beverly Hills will be a $17-million project including offices, shops and restaurants, when it is completed in 1962. The Ontra building was completed in 1958, and construction began late last year for the 9-story white marble Centre Building. Another multistory office building is scheduled for construction this year.

• **California bank** – California Bank completed a $15-million headquarters building in Los Angeles last year. The 18-story structure rises 267 ft above grade, and is the tallest building in the financial district.

• **College buildings**—San Fernando Valley State College is spending $42 million for the first phase of a long-range expansion program. Four classroom buildings and a cafeteria were completed last year, and a gym is scheduled for completion early this year.

• **Insurance building**—The framework for the Travelers Insurance Co. building in Los Angeles was completed last year. The $15-million structure will be 22 stories high. It is scheduled for completion this July.

• **Ala Moana center**—Nearly two-thirds of the $38-million Ala Moana shopping center in Honolulu was completed in 1960. There are now two levels of stores with more than 600,000 sq ft of selling space and parking for 5,000 cars. The Ala Moana Building, a 25-story combination business and professional structure with prestressed concrete framing, is nearing completion.

• **University project**—Construction involving more than $48 million was under way last year at the University of California at Los Angeles. The work included 15 projects, five of which were completed in 1960. Eight projects totalling $26.7 million are scheduled to start this year.

• **Shopping center**—Construction began last year on the $20-million Rossmoor Shopping Center in Long Beach, Calif. The first phase, consisting of five buildings including a supermarket and retail stores, is scheduled for completion by this fall.

• **Concrete building**—The American Cement Co. Building, now under construction in Los Angeles, will be an all reinforced concrete structure featuring precast concrete beams and X-panel (inclined columns forming a load-bearing wall). The $4-million building will have 14 stories, a penthouse tower and a four-story garage when completed.

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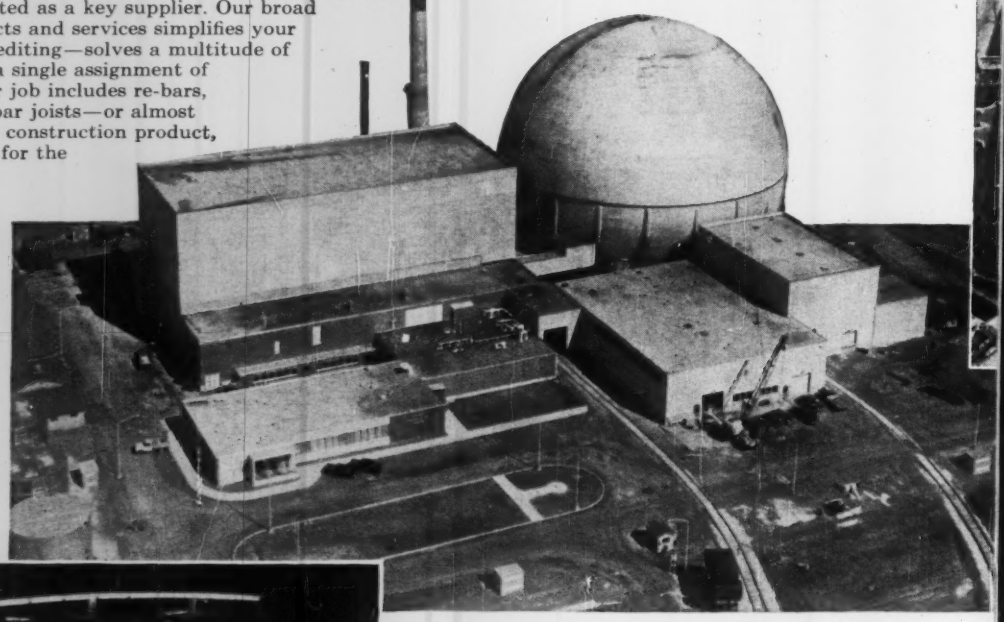
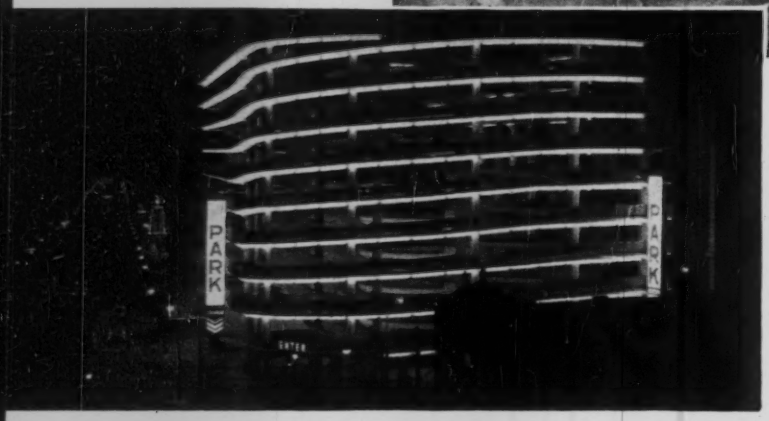


Nation's largest all-nuclear power station contains 2850 tons of re-bars from Ryerson. Foundation and shielding alone for the nuclear reactor assembly contain 22,000 cu. yd. of concrete, reinforced with re-bars from Ryerson.

Operator—Commonwealth Edison Company. Prime contractor—General Electric. Engineer-constructor—Bechtel Corporation.



Big new Seattle garage—a 10-story concrete structure—is reinforced with 1900 tons of re-bars from Ryerson. Schedule was so tight, the elevator shaft was built first to get machinery installed and running as soon as the structure was complete. 300,000 square feet provide parking for 1270 cars.

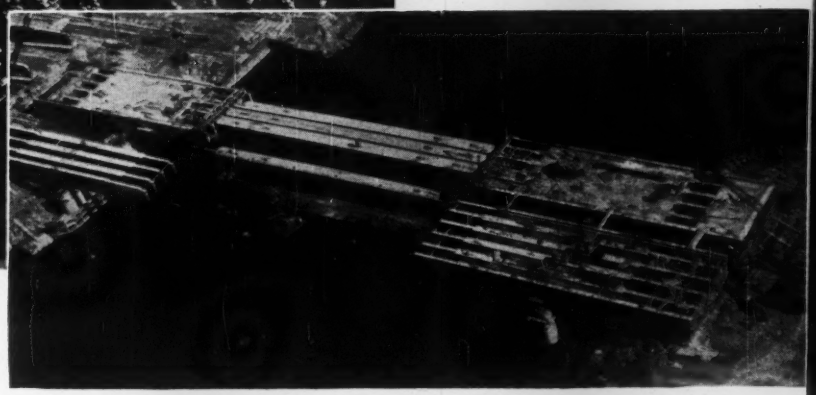
Owner—Sierra Corporation. Architect—George Applegarth. Structural Engineer—Ellison-Sedgwick. General Contractor—Utah Construction & Mining Company.

Chicago's new Exposition Center gets 3-way Ryerson service. With more than nine acres under roof, this gigantic convention hall will have over 300,000 sq. ft. of exhibition space and an auditorium seating in excess of 5000. Ryerson service includes 2200 bar joists; 15 post-tensioning cable assemblies that prestress the concrete floors; 5000 tons of re-bars to reinforce foundation, floors and walls of the entire 3-block-long structure.

Operating authority—Metropolitan Fair and Exposition Center, Inc., Chicago. General Contractor—Gust K. Newberg, Chicago. Alfred Shaw, chief architect—Carl Metz, structural engineer, Chicago.

Indiana's largest shopping center. Among the unique features of the new 55-acre Glendale Shopping Center in Indianapolis is a service tunnel—running the entire length of the center. Its 15" concrete retaining walls are reinforced by re-bars from Ryerson—as is the center's largest building. Total re-bars from Ryerson: 840 tons.

General contractor—Glendale Center, Inc. Construction agent—Inland Construction, Inc. Developers—Landau & Heiman, Inc. Planning and design—Victor Gruen Associates.

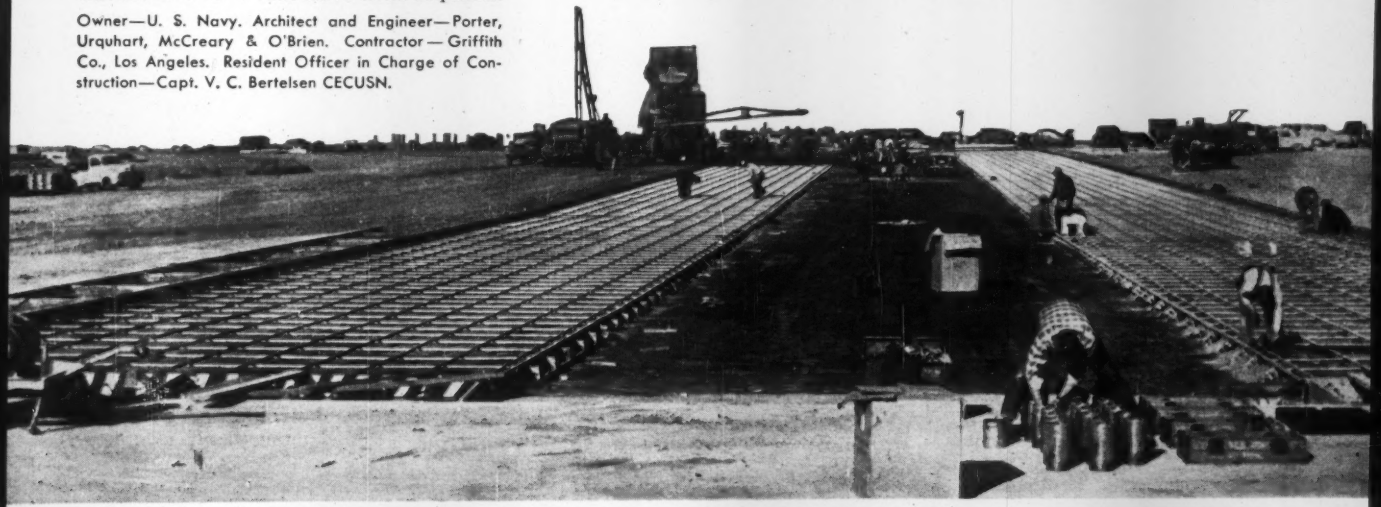


Nation's longest post-tensioned concrete span is the 320' center span of the Oneida Lake Bridge near Brewerton, New York. The post-tensioning "package" supplied by Ryerson included more than 1000 tendon and anchorage assemblies.

Owner—State of New York Department of Public Works (C. F. Blanchared, deputy chief engineer, bridges). Engineers—Summers, Munninger & Molke, Albany, N. Y. General contractor—all construction work performed by Terry Contracting, Inc., Long Island City, N.Y.

One of the longest post-tensioned projects. The new Naval Air Station, Taxiway at Lemoore, California, is a 512' x 75' *continuous ribbon* of prestressed concrete. The complete post-tensioning service from Ryerson includes 30 tendons that span the entire 512' length and 205 tendons that run the width. Concrete is 6" deep at the 312' x 25' center section—tapers to 9" at edges. If concrete had not been prestressed, uniform thickness of 12" would have been required.

Owner—U. S. Navy. Architect and Engineer—Porter, Urquhart, McCreary & O'Brien. Contractor—Griffith Co., Los Angeles. Resident Officer in Charge of Construction—Capt. V. C. Bertelsen CECUSN.



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A Sure Bet: More U. S. Spending

- **Look for increased aid for sewerage construction, more vigorous government policing as pollution problem stirs wide concern.**
- **The long-awaited Kerr report will focus public attention on such areas of construction interest as flood control and conservation.**

It would be surprising if 1961 failed to produce a strong stepup in federal spending for construction in the water resources field. The potent restraint formerly exercised by President Eisenhower's waiting veto won't be felt in the Congressional public works hearings, debates and voting this year. And even though its absence will be partly made up for by conservative legislators who used to vote for the hometown record and rely on White House brakes, there will almost certainly be some loosening of the federal purse strings.

The Democrats have pledged vigorous activity in natural resource development and conservation, water resources in particular. President Kennedy's Natural Resources Advisory Committee completed a report last week hailing the end of the "no new starts" policy. The document called for stepped-up programs in flood control, land reclamation, power, small watershed development and salt water conversion.

• **More sewerage money for sure**—The report also declared: "One of the earliest enactments of the Eighty-seventh Congress should be the Blatnik [Rep. John A. Blatnik (D. Minn.)] Pollution Control Bill."

With that mood prevailing, it's hard to see how a grants increase can miss. The Blatnik measure raises the federal money available to communities for sewage plant construction from $50 million to $100 million a year. There is still an easy majority for such measures in both houses, despite the loss of a few House seats by the Democrats in November, and there is little likelihood that President Kennedy will veto anything comparable to the Blatnik bill vetoed last year.

Added stimulation for sewerage construction is also likely from a strengthened federal hand in policing interstate waters. More federal authority in controlling pollution of coastal waters and streams crossing state lines is proposed in both Representative Blatnik's bill and a bill by Rep. William C. Cramer (R., Fla.). The Public Health Service is eager to get the additional enforcement capability so that it can tackle pollution of other streams with the success being achieved in the Missouri-Mississippi abatement campaign.

• **Cleanup drive succeeding**—Progress toward pollution abatement under PHS pressure in the Missouri and Mississippi basins is considerable. In the November election alone, voters approved construction spending of more than $100 million, including $75 million in Kansas City, Mo. St. Louis and environs voted more than $15 million earlier in the year for sewerage construction. Much stronger action can be expected from St. Louis after the city receives a report this summer on a current two-year study of its sewerage needs. Even reluctant St. Joseph, Mo., which has been hailed into court by the Justice Department to force compliance with PHS cleanup orders, may beat the judge to the draw by falling in line voluntarily like all the other towns called on by PHS to act. After several bond-issue rejections at the polls during the last few years, the city will vote again this spring.

The underlying pressure building up for sewerage construction is, of course, public opinion. Mounting awareness of stream pollution and the fact that it can be improved, and growing popular acceptance of an obligation to do something about it are both reflected and generated in the political popularity of the topic and the increasing notice given to water pollution in the popular press.

• **White House airs the problems**—The first White House conference on the subject drew a broad cross section of interested groups to Washington in December. The avowed aims of the meeting, as set forth by Health-Education-Welfare Secretary Arthur S. Flemming, were to identify controversial issues, hear all sides and make specific recommendations for action.

For three days engineers, municipal and state health officials, legislators, industry representatives, bird lovers, fishermen, conservationists, representatives of civic organizations, and others concerned with water pollution swapped viewpoints, complaints, protests and remedies. Their recommendations came out a watered-down synthesis of conflicting opinions, but agreement was general on certain ideas, notably: More research and stream monitoring are needed as a basis for action; industry should get some financial incentive, such as tax relief, for waste-treatment plant construction; pollution control should be planned and carried out on a basin-wide basis; states and municipalities should retain primary responsibility in pollution abatement, but the federal government should exercise leadership; a benefit-cost system of evaluating health, esthetic and market values of pollution abatement must be developed as a basis for sound public policy.

From the political point of view, the conference was badly handicapped by its lame-duck timing. At the time of the meeting, the Eisenhower Administration, which sponsored it, had little more than a month left in office. Although the ideas and recommendations coming out of the conference have no particular partisan identity, the Kennedy Administration might well want to pass up the opportunity to refine or further study the conference results in favor of action more closely identified with the Democrats.

• **Kerr report may have answers**—Fortunately, there may be a ready-made springboard for such an effort, stamped plainly with the Democratic label. This is the two-year study of U. S. water resources needs through the year 2,000, completed this month by Senator Robert S. Kerr's Senate Select Com-

for Water Resources Construction

ICE HARBOR DAM AND LOCK, on the Snake River near Pasco, Wash., is the prototype for three other Corps of Engineers projects to be built farther upstream. One of them, Lower Monumental Dam, will be started this year.

mittee on National Water Resources (see ENR next week).

The committee report is expected to provide a basis for broad-scale legislation in the whole field of water resources. In its studies, the group drew heavily on government agencies with specialized interests in depth in particular areas of water resources: for example, the Corps of Engineers on flood control and navigation, the Bureau of Reclamation on irrigation, the Geological Survey on hydrological data and Census Bureau on population growth. Private foundations and consultants also participated under contract to the committee, and the committee held public hearings at widely scattered points across the country to give all interested groups a chance to present facts and arguments.

• **Administrative reform**—There is some opinion in Congress and elsewhere that the present government machinery for dealing with water problems has to be remodeled. Representative Blatnik proposes to remove water pollution control from the Public Health Service and give it new status within the Health-Education-Welfare Department on a par with that of the PHS. He thinks it might be wise to go even further and take it out of HEW altogether. Former Secretary Flemming also proposed reorganization, a mild one within the PHS however. Mr. Schad, in discussing the work of the Kerr Committee, took cautious note of criticism of water resources handling in both Congress and the Executive Branch. There are 25 federal agencies with responsibilities in the field, he said. He expressed, however, that there would be any changes in Congress or consolidation of the work of the agencies.

• **Statistical prosperity**—Even without the stimulus of things yet to be done, sewerage construction will probably boom moderately this year. On the basis of continued growth of the backlog of planned projects, ENR's statistical forecast sets 1961 sewerage construction volume at $725 million, 17% above last year. The 1960 volume of $620 million was 5% below 1959.

A curious development in sewerage construction last year was a big increase in sewer projects accompanied by a slump in sewage treatment plant contract awards. Public Health Service figures showed both the rise and the drop exceeding 25%, as compared to 1959 figures. The drop in plant construction was traceable mainly to a lag in construction by big cities. This was not entirely explainable, but speculation was that the slow rate in larger cities was due partly to the $250,000 limitation on individual general construction grants under the 1956 pollution control act and partly to a possible election-year trend of elected officials to shy away from treatment plant construction in favor of works more easily seen and appreciated, like roads and parking areas.

• **National water shortage**—The Public Health Service continued to sound the tocsin last year on impending water supply troubles. Principal points: Population and industry continue to grow, which multiplies the demand for water, and to concentrate along streams, which intensifies the pollution problem; industry and science continue to develop new substances with physiological effects of unknown but possibly harmful nature, which enter streams and ground water in waste effluents and agricultural drainage and remain in the water because ordinary methods of treating water and sewage do not remove them.

Those in the water industry usually accept these statements as the sober reports and forecasts they are. But warnings like these and water use statistics such as the Commerce Department issues are occasionally interpreted and

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embellished by less restrained observers to reveal a monstrous threat. Withdrawals from streams are viewed as permanent disappearances and we are seen squabbling over a poisonous trickle in a matter of a very few years.

Such melodramatic treatment (or mistreatment if you prefer) of factual information, however painful to those in the water field who yearn for understanding and appreciation of the good service they render, is probably doing more to further their aims than the more customary recitations of virtue. For it is achieving an indispensable prerequisite of public appreciation: It is getting the public's ear.

For those who want to listen (and there are more of them after the worst is advertised), there is ample rebuttal to the scare stories or to the "precipice approach," as one engineer termed the mildly panicky reaction of those who buy the more flamboyant views. Industry is particularly sensitive because it is frequently charged as the number one pollutor and also because it fears getting soaked by regulatory agencies blind to all but its faults.

Industrial users presently re-use water 100% (two uses total) and the figure may be expected to rise to 400% in the future, according to Albert E. Forster, Hercules Powder Co. chairman.

Re-use is a "most fruitful field for research and development," states Abel Wolman, whose consulting organization, Abel Wolman Associates, made a study of the subject for the Kerr Committee. In Mr. Wolman's view: "It is axiomatic that water re-use generally follows upon the necessities of local circumstance. It is rarely practiced purely as a virtue . . ."

Also according to Mr. Wolman, the 560 billion gallons sometimes cited as our daily requirement by 1980 shrinks to 120 billion gallons when we speak of consumptive use rather than total withdrawals. The figure represents about 11% of the average stream flows.

• **Experimental water progress**—Construction will go ahead this year on three or more of the five water desalting plants to be built under the Interior Department's demonstration program. Construction contracts have been awarded for those at Webster, S. D., Freeport, Tex., and San Diego, Calif. Next to be awarded will probably be the plant at Roswell, N. M. No site has been selected for the East Coast plant, but Interior's Office of Saline Water has announced that the process will be one of the freezing methods.

There is no immediate prospect that desalting will be able to compete economically with developing and transporting surface water, according to reports made to the Kerr Committee. However, it does merit continued effort. Prospects are even more distant for gaining much from weather modification, evapo-transpiration reduction and more accurate weather and climate-cycle forecasting. Techniques are at hand and possibilities appear good for making use of evaporation reduction and seepage control, waste water salvage and re-use, control of phreatophytes (water-loving plants), and applications of nuclear energy for exploration.

Automatic water quality monitoring systems were put into operation last year on the Ohio and Delaware Rivers. The Ohio system, owned and operated by the eight-state Ohio River Valley Water Sanitation Commission, will eventually check 10 quality variables (dissolved oxygen, acidity, turbidity, etc.) at 40 unmanned stations and relay them to the commission's headquarters in Cincinnati.

• **Columbia and Colorado outlook**—Events of profound and historic significance occurred last year in connection with two river basins in the West—the Colorado and the Columbia.

In March, U. S. Supreme Court Special Master Simon H. Rifkind made public the recommendations he would send to the Supreme Court for apportioning Colorado River water among states which had been disputing the matter for 40 years or more.

In October, the U. S. and Canada tentatively agreed on a cooperative plan for development of the Columbia River that involves nearly a billion dollars worth of construction in the next ten years.

The Colorado decision—barring the unlikely possibility that the Supreme Court will act contrary to the special master's recommendations—will give Arizona the right to a million acre-ft of mainstream water that California has already spent millions of dollars to collect and transmit.

Arizona has no immediate use for the water. Nor for that matter does California need it all yet. But both states regard it as a vital element for future growth.

For Arizona, the additional water reopens the prospect of carrying out a $1.5-billion irrigation development called the Central Arizona Project. This involves a power dam at Bridge Canyon on the Colorado upstream from Hoover Dam, and diversion of water from either Bridge Canyon Reservoir or Havasu Lake (Parker Dam) to a distribution point near Phoenix. From there the water would be distributed over a broad area including points as far south as Tucson.

• **California moves boldly**—For California, the loss means turning to the north

1761-1961

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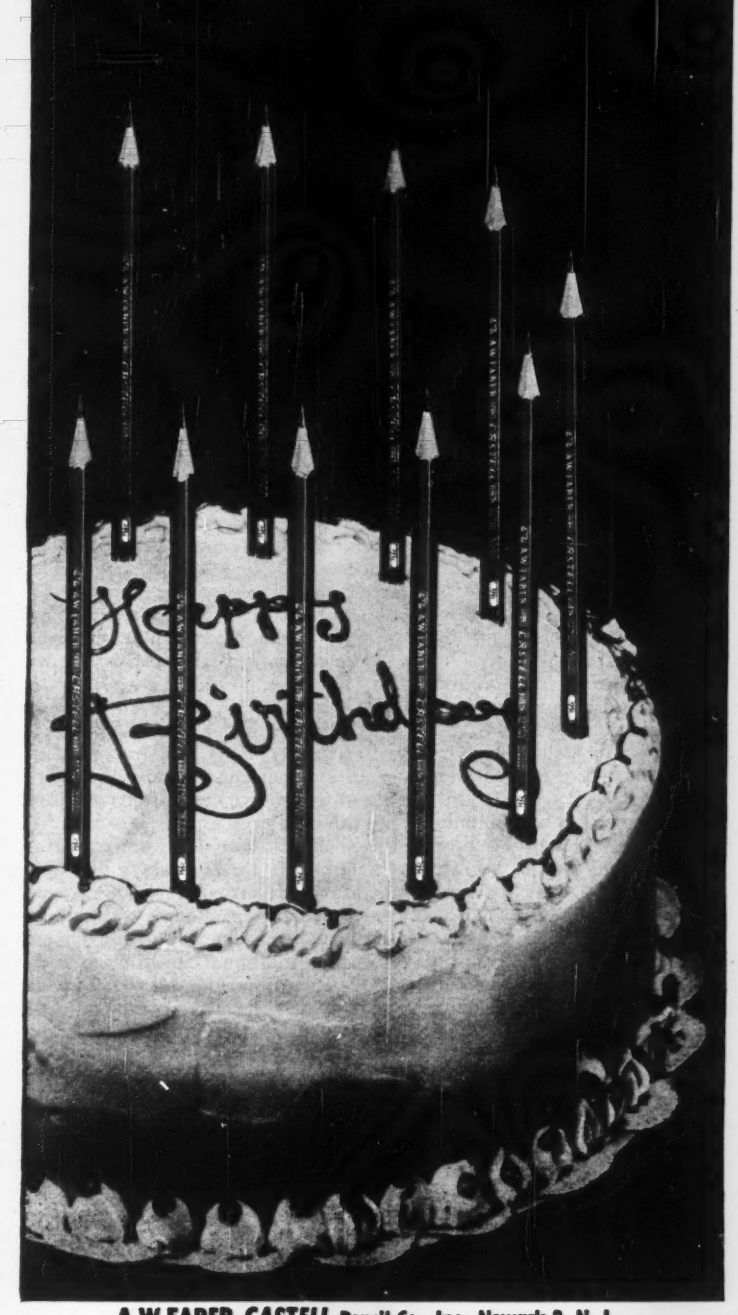

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OUR BICENTENNIAL YEAR — 1761 - 1961 ★ 200 YEARS OF UNINTERRUPTED MANUFACTURING EXPERIENCE.

NEW CUMBERLAND will be the first lock and dam completed under the Corps of Engineers' billion-dollar modernization of the Ohio River navigation system. Parallel 1,200-ft and 600-ft chambers are typical of later projects.

for water to support a swelling population that will outstrip presently available sources in the next 10 to 20 years. And turn north the state has. In November, California voters put their stamp of approval on the boldest water resources venture ever undertaken. They voted a $1.75-billion bond issue to finance construction of dams, powerhouses, aqueducts, pumping stations and other works needed to store the surplus water of Northern California rivers and transmit it to areas of need as far south as San Diego.

The California water plan has no precedent, either financially or engineering-wise. The bond issue is the biggest ever authorized by a state, and the total cost of the development will eventually go even beyond the amount presently voted. Physical features of the undertaking will include such standouts as Oroville Dam, the highest (730 ft) fill-type dam ever built; and the Southern California Aqueduct, whose 500-mile-plus route southward from the Sacramento-San Joaquin delta will involve a 2,165-ft pump lift over the Tehechapi Mountains.

California's Department of Water Resources did not wait for the results of the bond election to start work on some features of the big plan. Nor will it have to depend on bond proceeds until two or three years from now. With money available from other sources, the agency has been working on relocation projects for Oroville Reservoir and also doing considerable preliminary planning and design. Since a lengthy amount of detail planning and design remain yet to be done, there is enough money so first bonds won't have to be sold until 1964.

Ironically, only a week or so before Judge Rifkind released his recommendations on Colorado River water, ceremonies were held marking completion of the Colorado River Aqueduct, which carries water across California from Parker Dam to the Los Angeles area. The final stage was a $200-million expansion begun in 1952. It brought the capacity up to 1,212,000 acre-ft a year, more than twice the amount that will be left after users with higher priorities (irrigation districts) take their share of the Rifkind allocation.

However, the aqueduct can be used to capacity for a number of years—10 or 15 maybe—until Arizona develops works to transmit and use more water. During that time, California could use the available water to recharge depleted ground-water reservoirs in Southern California if the legislature should approve a plan suggested by the Metropolitan Water District, which serves a five-county area including Los Angeles.

• **Columbia settlement**—The Columbia River treaty, already signed by President Eisenhower and Prime Minister John Diefenbaker and ready for ratification, is the happy ending to what has seemed at times during the past decade to be a hopeless impasse.

Still to be settled before construction can begin, however, are internal differences between the Canadian federal government and the government of British Columbia over financing and priorities. The issues are not crystal clear, but among the evident factors is some sentiment in British Columbia for giving first or equal priority to Peace River hydro development. This is planned by a group called Peace River Development Corp., of which the prime mover is Swedish industrialist Axel Wenner-Gren. There is some apprehension in both Ottawa and British Columbia that prior or simultaneous Peace development would drain off enough construction capability and satisfy enough of the potential power demand to delay the Columbia project and upset the timetable.

The Columbia agreement calls for construction of three storage dams in Canada in the first 10 years: High Arrow, $71.8 million, and Mica, $247.2 million, both on the Columbia mainstream; and Duncan, $25.6 million on the Duncan River, a downstream tributary of the Kootenay. High Arrow and Duncan are to provide 8.5 million acre-ft of storage five years after ratification of the treaty. Mica Creek will add another 7 million acre-ft four years later.

The agreement also clears the way for, but does not require, U.S. construction of Libby Dam on the Kootenai River in Montana. Libby's cost is estimated at $323 million. On the condition that construction of Libby is begun within five years after ratification of the treaty, Canada agrees to no diversion of Kootenay water upstream from the site for 20 years and to limit diversions after that. Canada also will provide and prepare at its own expense the portion of Libby Reservoir lying in Canada. Additional construction under, or resulting from, the treaty will include new hydro capacity at existing U.S. dams and at the proposed Canadian dams, and transmission lines to deliver Canada's share of the added downstream power.

Canada's return would be half the additional power production her storage projects make possible at downstream power plants in the U.S., plus a cash payment for half the flood-control benefits accruing in the U.S.

The pact contains an assurance that is most important from the U.S. point of view—namely, that Canada will not divert Columbia water into the Fraser River or any other basin.

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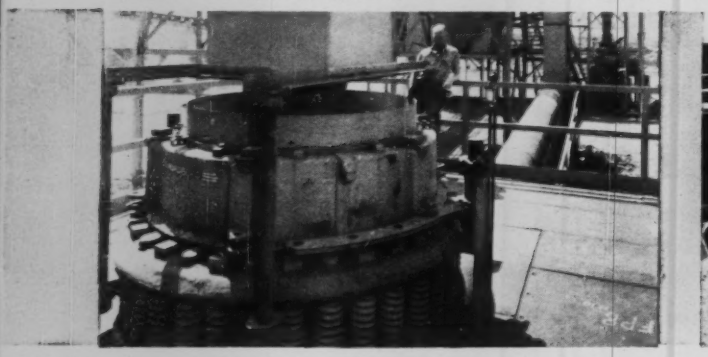

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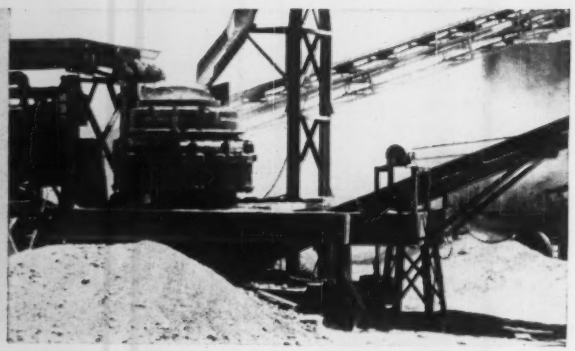


FOR PORTABLE PLANTS

Symons Cone Crushers are being used in increasing numbers for portable and semi-portable crushing plants. View shows part of a Cedarapids portable crushing and screening plant, utilizing a Symons Cone Crusher. Unit is serving a large Texas aggregate producer.

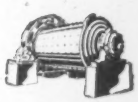
C-150

ILLINOIS TOLLWAY

(ABOVE:) Tri-level interchange of Northwest and Tri-State Tollways near Chicago's O'Hare International Airport.

(RIGHT:) View of the modern Northwest Tollway bridge crossing the Fox River near Elgin, Illinois.

SYMONS PRIMARY GYRATORY CRUSHERS



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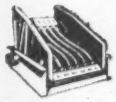
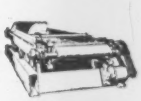


SYMONS VIBRATING GRIZZLIES



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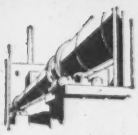
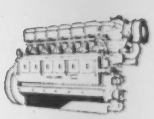


ROTARY KILNS AND DRYERS



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FIRST NIAGARA POWER goes on the line February 10 at Robert Moses Generating Station (foreground). Pumped storage power is in background at beginning of canal.

1. Columbia and North Pacific Basins

• **Clark Fork River–**

Noxon Rapids Dam–Washington Water Power Co. dedicated its $87 million project July 9, 1960. Started in 1956, powerplant capacity is 400,000 kw.

• **Columbia River–**

John Day Lock and Dam–The principal contract under way last year on this $418-million project was for $32.5 million and covers placement of the north shore abutment, nonoverflow section of the dam, fish ladder, and the 19½ spillway bays.

Priest Rapids Dam–The Grant County Public Utility District reports this $149-million 98% complete and scheduled for September 1961 completion.

Wanapum Dam–Eighteen miles upstream from Priest Rapids, Grant County PUD is building Wanapum Dam–a $177.4-million hydro plant. During 1960 work went forward on spillways, fish ladders, and approach and tailrace excavation. Powerhouse excavation is about 90% complete.

Rocky Beach Dam–Chelan County PUD says its $273-million hydro project is 85% complete. The over-all project is aimed at a February 1962 completion target.

• **Cowlitz River–**

Mayfield Dam–The power tunnel was completed and penstock elbows were in place last November when slides and high water in the river caused a 60-day delay and losses exceeding $100,000. The project is 65% complete.

• **Green River–**

Howard Hanson Dam–The Corps of Engineers reports this 235-ft rockfill 60% complete. The diversion tunnel and intake gates were completed last year while fill placement will start this spring. The $37.5-million project is due for completion in the fall of 1962.

• **Middle Fork, Willamette River–**

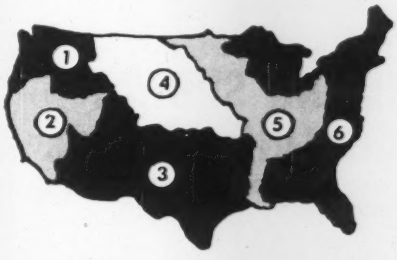
Hills Creek Dam–Fill placement continued last year on this 11-million-cu-yd earth and gravel dam. The $45.8-million project is scheduled to be ready for flood control service this October.

• **Skagit River–**

High Gorge Dam–Concrete placement was completed and reservoir buildup started during 1960 on this $20-million power project owned by Seattle City Light. Two 208-ton spillway gates were installed after the 300-ft gravity arch dam was topped out.

• **Snake River–**

Ice Harbor Lock and Dam–The Corps of Engineers reports this $123-million facility 83% complete at year's end.



PROJECTS are grouped by major drainage areas, as shown on the map.

Lower Monumental Lock and Dam–While only engineering and design work went forward in 1960 this year will see award of the first construction contracts for this $150-million Corps of Engineers' project. Power capacity, initially, will be 363,000 kw.

Oxbow Dam–The end of this year will see over-all completion of this 200,000-kw hydro development in the Hells Canyon reach of the Snake.

• **South Fork McKenzie River–**

Cougar Dam–The Corps of Engineers estimate completion at 46% on this 485-ft-high rock and earthfill structure.

2. Central Valley and South Pacific Basins

• **San Joaquin Valley–**

Success Dam–This $14-million earthfill on the Tule River is 98% complete. The 142-ft-high dam will provide flood control and irrigation benefits.

Terminus Dam–Another earthfill, this one 250-ft high, it is 60% complete. Located on the Kaweah River, the dam will cost $21.5 million.

• **Upper American River Project–**

Jaybird Tunnel–Four miles long, this $5.5-million bore was also completed at year's end.

Jaybird Powerhouse–Late spring should see 66,500 kw flowing from the first unit at Jaybird. A second generator will go on the line in 1962.

Union Valley Dam–Work advanced to the 20% mark last year on 428-ft-high earthfill. Cost: $13.5 million.

• **Central Valley Project–**

Trinity Dam–This 465-ft-high earthfill was topped out late last fall as its 2.5-million acre-ft reservoir began filling. Cost; $48-million.

Clear Creek Tunnel–Nearly 11 miles long, 17.5-ft in diameter, the power tunnel had advanced to the three quarter mark at year's end.

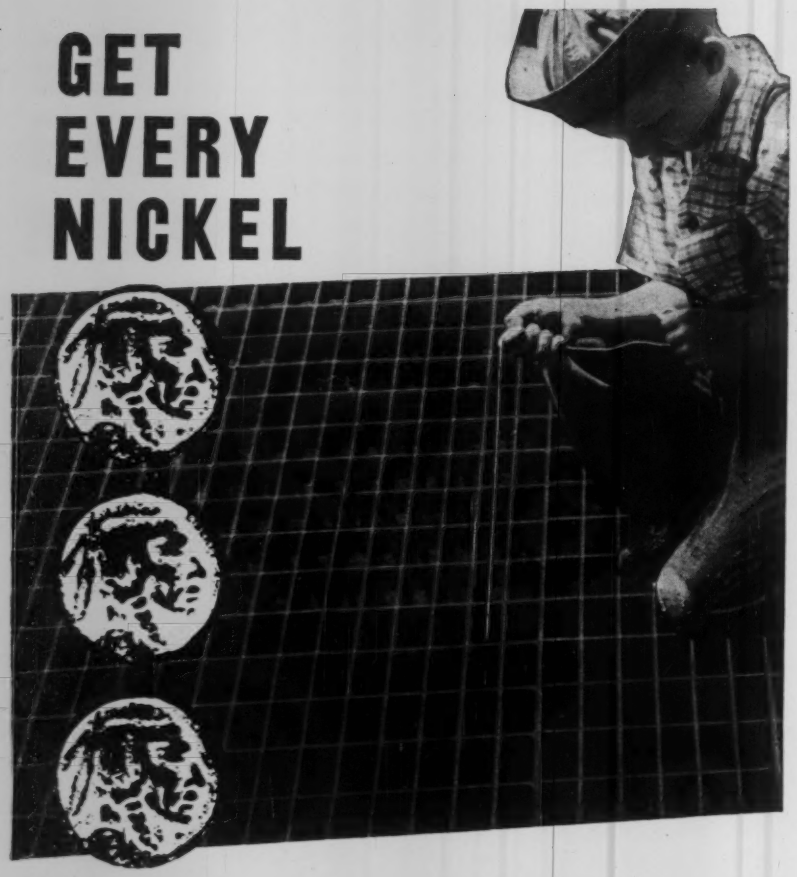
Whiskeytown Dam–This $18-million earth and rockfill embankment was 25% complete on December 31.

Spring Creek Tunnel–Just getting under way at year's end, this 18.5-ft-dia tunnel is expected to cost $16 million.

• **Feather River Project–**

Oroville Dam–Approval by California voters of the $1.75 billion bond issue has paved the way for a start on this $390-million earthfill, probably in 1962. Considerable preliminary work has already been done in the area of the 3.5-million acre-ft reservoir.

GET EVERY NICKEL



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. . . River Use and Control

San Luis Dam—This project that will serve both California and the Bureau of Reclamation is set for a start this year. State cost: $230 million; Federal cost: $170 million.

• **Oroville-Wyandotte Project—**

South Fork Feather River—Oroville Wyandotte Irrigation District's $62-million water and power project was about 20% complete at year's end.

• **Kings River Project—**

Kings River Powerhouse—This is the third and final new plant of Pacific Gas and Electric's $80-million program on the Kings River. The $12.9-million 42,000-kw project is 40% complete.

• **Cherry Canyon Development—**

Cherry Powerhouse—Started in 1957, this $30-million phase of San Francisco's mountain water and power system was completed during October of 1960.

• **Southern California Flood Control—**

Los Angeles County—The County Flood Control District reports work under way last year on an estimated $50 million worth of projects. Starts in 1961 should amount to $70 million, $50 million of that to be awarded in the first six months.

San Antonio, Chino creeks—A $10.9 million project, it is 99% finished. Details—Over 15 miles of concrete-lined channel that required construction or modification of over 30 bridges.

3. Colorado, Gulf, Arkansas, White, and Red Basins

• **Upper Colorado River Project—**

Glen Canyon Dam—A third cableway was installed for placing powerhouse concrete in an attempt to recover a six month lag created by a 1959 strike. The contractor on the $325-million project claims the dam will be finished on time in late 1964.

Navajo Dam—More than 17 million of the 26.3 million cu yd called for have been placed in this earthfill. Weather permitting, the dam should be topped out this December, one year ahead of schedule. Over-all job is 70% complete.

Flaming Gorge Dam—Prime contract is 37% complete. Cold weather ended concrete placement last November, however, some 40,000 cu yd were placed during 1960.

• **Arkansas River Basin—**

Dardanelle Lock and Dam—This $90-million navigation project on the Arkansas is 12% complete. Last year the 600 x 100-ft lock was completed

GLEN CANYON DAM rises from the Colorado riverbed in the shadow of the spectacular 1,000-ft arch bridge. Tailrace portals are clearly visible.

for $3.2-million, and a $6.9-million contract for the dam overflow section was started.

Keystone Dam—Last year $14.6-million in contracts were awarded on this Arkansas River dam, and contracts for $20-million will be awarded this year. The $111-million project will be finished in 1965.

Eufala Dam—New construction totaling $28.5-million was started on this $126-million project last year, and $20-million in contracts will be awarded this year. Located on the Canadian River, it is 21% completed and will be finished in 1965.

Oologah Dam—Closure of this $35-million dam will be made this year, with completion set for June 1962. It is 89% completed.

• **White River Basin—**

Greers Ferry Dam—Total cost, $50-million; status, 41% completed; 1961 contracts, $4-million; completion by June 1964.

Table Rock Dam—The last two hydro power generators will be installed this spring in this 200,000-kw, $66-million project.

• **Red River Basin—**

Millwood Dam—This $55.7-million project on the Red River, will get under way this year.

Abiquiu Dam—This 325-ft high flood control dam on the Rio Chama, in New Mexico, is 50% completed. Major contract is $8.5-million for main embankment and off-channel spillway.

• **Texas Gulf River Basins—**

McGee Bend Dam—A $60-million multiple-purpose project, it is about 33% completed. Around $7-million of contracts will be awarded this year.

Waco Dam—To furnish water supply and flood control for Waco, Texas, this project is about 30% complete. About $9-million of contracts will be awarded this year on the $37.5-million project.

Navarro Mills Dam—This $10-million project is 27% complete. Contracts awarded last year totaled $2.5-million, and about $2-million worth will be let this year.

Proctor Dam—This $18-million flood control and water supply project in west-central Texas got under way last year. Contracts totaling $11.5-million will be awarded this year including the concrete dam and spillway.

• **Reclamation Region 5—**

Canadian River—Construction is expected to start this year on this $96-million multipurpose project that will supply the Texas High Plains area with water.

Washita Basin — This 16,000-acre irrigation project is 50% completed and will be finished in 1964. The $8-million Foss Dam is 72% finished and the $1.4-million Anadarko Aqueduct is 90% finished.

4. Missouri Basin

• **Missouri River Basin—**

Oahe Dam—This $360-million multipurpose project is 65% finished. Its 91-million cu yd embankment is done.

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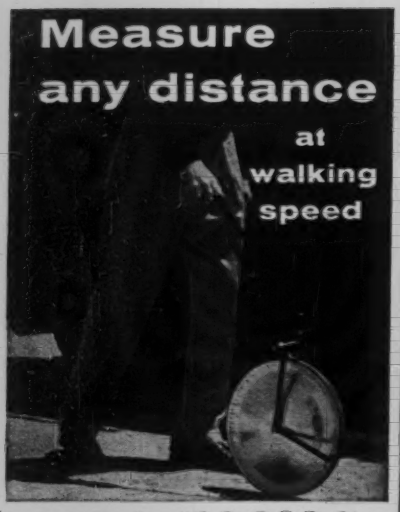

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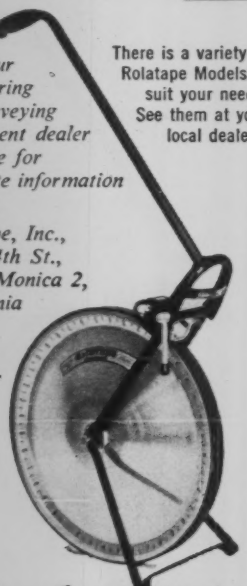

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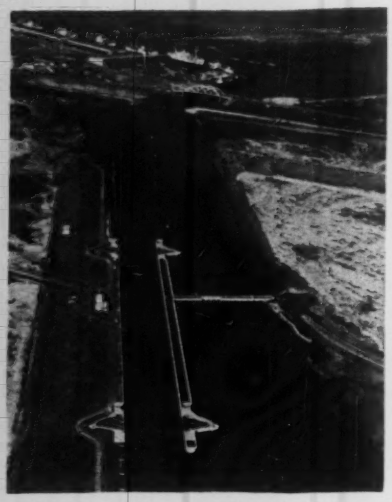

O'BRIEN LOCK on Chicago's Calumet River is 1,000 ft long. Cost: $5.9 million.

Last year $9.3 million of contracts were awarded, and $40 million completed.

Big Bend Dam—This sixth and last main stem dam on the Missouri River will cost $127.5 million, and generate 468,000 kw of power. Four contracts were awarded last year for earthwork, generating units, powerhouse substructure and intakes total $27.5 million.

Fort Peck Dam—A second power plant with two 40,000 kw generators will be completed this year, for $23.8 million. Total capacity will be 165,000 kw.

Garrison Dam—This $291-million, multipurpose project is complete and operating. The last two 80,000 kw generators were placed in service last year. Total power installation is 400,000 kw.

Fort Randall Dam—This $194 million project, with 320,000 kw power installations is in operation.

Gavins Point Dam—Also in operation is this $49.2 million project with 100,000 kw of hydropower.

Tuttle Creek Dam—This $82.2 million project on the Big Blue River in Kansas, is now 76% complete and will be finished this year. Contracts totaling $19 million were completed last year.

Pomme de Terre Dam—Now 75% completed, this $15.6 million flood-control dam in Missouri will be finished this year.

Pomona Dam—Also a flood-control dam, this $14.1 million project in Kansas is 25% complete. About $1.3 million of contracts will be awarded this year.

• **Bureau of Reclamation Region 7—**

Farwell Unit—This project in Nebraska to irrigate 52,530 acres of new lands, is reaching peak activity in a seven-year construction program. Sherman Dam, costing $5 million, with 69,100 acre-ft of storage, will be completed in February 1962.

Frenchman-Cambridge Division—This $80-million project in Nebraska's Republican River Basin is nearly 90% complete. It will provide irrigation for 64,280 acres. Red Willow Dam, started last year, will be completed in 1962.

Ainsworth Unit—A contract is expected to be awarded next month for initial construction on Merritt Dam on the Snake River in Nebraska. Project cost is $26-million.

5. Mississippi and Ohio Basins

• **Lower Mississippi River—**

Mississippi Levee System—This 1,578-mile levee system is one of the major features of the Corps of Engineer's comprehensive construction and maintenance program in the Lower Mississippi valley. About $71 million was spent on this program in fiscal '60 while $75 million will be spent in the current fiscal year.

Old River Control—This comprehensive project to pass both low flows and flood flows of the Mississippi River into the Atchafalaya Basin, above Baton Rouge, is 57% complete.

Carlyle Dam—Costing $40 million, this project will give flood protection for 75,000 acres in the Kaskaskia River valley and aid navigation in the Mississippi. It will be 20% finished by June 30, 1961.

Mississippi River-Gulf Outlet—Nearly $19 million has been appropriated by Congress for this $105 million project to improve navigation from the Mississippi into the Gulf of Mexico. Considerable dredging has been completed to date.

• **Upper Mississippi River—**

Red Rock Reservoir—Stage I construction of this $68-million flood control project on Iowa's DesMoines River is 25% complete. Completion: 1967.

St. Anthony Falls Locks—A $9.6-million contract for the 400 x 56-ft upper lock is 20% complete. Total project cost is $31.6 million.

• **Ohio River Basin—**

New Cumberland Locks and Dam—Both locks are completed and ready for operation, while the high-lift dam is 81% complete. Over-all $38.9-million project is 88% finished now.

Pike Island Locks and Dam—This $62.9-million project got underway in 1960 and at year's end the locks were 21% complete.

Greenup Locks and Dam—Five old locks and dams will be eliminated by this $53.9-million installation. Both locks are done and the dam is 58%

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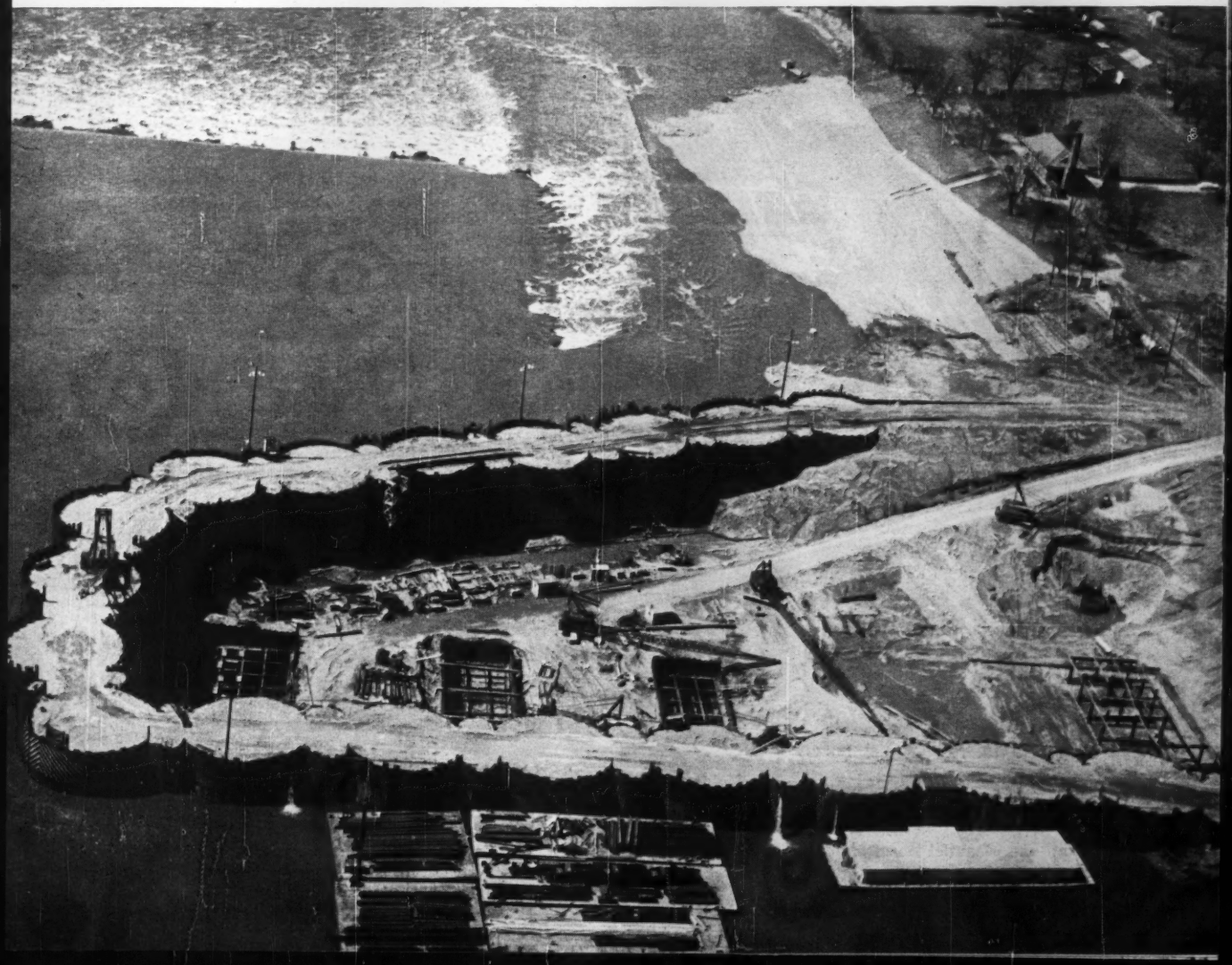


complete. December of this year will see over-all completion.

Captain Anthony Meldahl Locks and Dam—A $77.9-million, dual lock facility, this project is 26% complete. Locks are 53% finished and the high-lift dam will start within next two months.

Markland Locks and Dam—Corps of Engineers reports the project 55% complete. Both locks are done and the dam is 44% complete. Completion is set for December 1962.

McAlpine Locks and Dam—Modernization at this installation, formerly known as Lock 41, is about half done. A new 1,200-ft lock is 95% complete.

Barkley Dam—An 800-ft-long lock is 86% complete on the $183-million multipurpose project which will include an 130,000-kw powerhouse, high lift dam, and a canal connecting the Cumberland and Tennessee rivers.

Nolin Reservoir—A flood control and flow regulation dam, this fill embankment is 18% complete. Located in Kentucky, the $15.2-million project will be finished in December of next year.

Allegheny River Reservoir—Another major in the Corps' flood control program, this concrete and earth dam is just getting under way as relocation work begins. The $114-million project will impound 1.2 million acre-ft and be finished in 1965.

Shenango River Reservoir—Ground was broken last summer for this concrete flood control dam. November 1964 is completion target for the $32-million job.

Summersville Reservoir—Located on the Gauley River in Virginia, this rockfill will cost $47.8 million and be finished in '64. Initial contracts let last year for over $6 million are 25% complete. Purpose: Flood control.

Dillon Dam—This $31-million flood control dam was dedicated last October.

• **Tennessee Valley**—

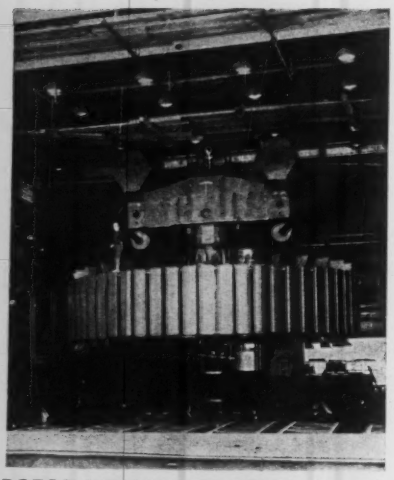
Melton Hill Dam – Construction started last September on TVA's $34-million power project on the Clinch River in Tennessee. Besides a concrete gravity dam, the job includes a navigation lock and 72,000-kw powerhouse. Completion target: 1963.

Wheeler Lock—A $16-million new main lock was started in October with a maximum lift of 52 ft.

6. Atlantic Ocean Basin

• **New England Flood Control**—

Blackstone Basin—Over $11 million in work involving three projects was under way last year. Both the Woonsocket Dam and Channel Improvement and the Worcester Diversion project were completed during 1960. West Hill Dam, an earthfill on the West River, is 78% complete.



ROTOR WEIGHS 590 TONS for 150,000-kw generator at Niagara Power Project.

Connecticut Basin—Of five earthfill dams under way in this basin, two were finished last year. Completed were North Hartland and North Springfield, both in Vermont. The 265-ft-high Ball Mountain Dam was 95% finished at year's end as was Townshend Dam on the West River. Just started last year the Mad River Dam is 6% complete.

Housatonic Basin—Thomaston Dam on the Naugatuck River was finished last year, while the smaller Hall Meadow Brook Dam is 11% complete.

Merrimack Basin—The two-dam Hopington-Everett project representing a Corps of Engineers' expenditure of $24 million, was 40% complete at year's end.

Thames Basin—Two of three major dams in this drainage basin were completed during 1960. The Hodges Village and East Brimfield dams were both finished in June. Westville Dam is 21% complete and aimed at a December '61 finish.

• **Roanoke Basin**—

Smith Mountain Project—This two-dam $50-million power project is about 5% along. Appalachian Power Co. reports the upper reservoir will be pumped for storage.

Gaston Dam—Another $50-million hydro development, this 105-ft earthfill was started last year by Virginia Electric and Power Co.

• **Catawba River Basin**—

Cowan's Ford Station—Duke Power Co., Charlotte, N. C., started a $60-million hydro project last year that involves a mile-long concrete dam and a 350-000-kw powerhouse.

• **Savannah Basin**—

Hartwell Dam—This $89.3-million, multipurpose project was started in 1955 and has now reached 64% of completion.

• **Apalachicola River Basin**—

Walter F. George Lock and Dam—This project, estimated to cost $78.9 million, is about 50% complete and scheduled for a 1963 finish.

Columbia Lock and Dam—Contract for construction of the lock and dam was awarded last year for $8.9 million. The total project is estimated at $13.6 million and is 17% complete.

• **Mobile Basin**—

Jackson Lock and Dam—The Corps reports 89% completion on this $21-million navigation project on the Tombigbee River.

Lewis Smith Dam—June of last year saw completion of the main embankment containing about 5 million cu yd. First power is due this summer from the first of two 80,000-kw units, according to Alabama Power Co.

Weiss Dam—Another Alabama Power Co. hydro project on the Coosa River, Weiss Dam was completed last year. Units 1 and 2 will go on the line this June; the third generator, a year later. Total capacity: 84,000 kw.

• **Central and Southern Florida**—

Flood control and drainage—This long term Corps of Engineers' project was 24% complete at year's end. Contracts totaling $8.5 million were completed during 1960, while $15 million worth of contracts were awarded during the year.

• **Great Lakes, Niagara River**—

Niagara Power Project—First power goes on the line on the 10th of next month at the Robert Moses Generating Plant, main power plant at the $720-million project—the nation's biggest construction job.

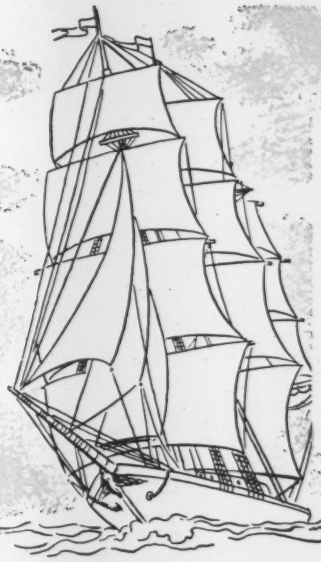
Great Lakes Channels—The Corps of Engineers' $129-million program of deepening the Great Lakes connecting channels to 27-ft is over 50% finished, and scheduled for completion by July 1962.

New Poe Lock—Construction is expected to start early this year on the new 100 x 1,000-ft Poe Lock at Sault Ste. Marie. Completion of the $42-million project will require about five years.

Calumet-Sag Channel—A 13-mile reach of this $92-million navigation project has been widened from 60 ft to 225 ft. The project includes the replacement or alteration of 47 railroad and highway bridges.

Why Rust-Oleum is different—

and how this difference helps to keep your equipment looking in top shape against rain, sun, heat, fumes, and weathering!



A Sea Captain developed it . . . Industry proved it!

The original Rust-Oleum formula was developed nearly fifty years ago by Sea Captain Robert Fergusson, who became intrigued with the rust-stopping qualities of fish oil early in his career. Creating a special treatment for the fish oil, he used the specially-processed fish oil as the vehicle in combination with fine rust-inhibiting pigments. The result? A coating that actually *stopped rust* when applied directly over sound rusted surfaces, after scraping and wirebrushing to remove rust scale and loose rust. Possible, because the *specially-processed* fish oil penetrated the rust to bare metal. This was the birth of Rust-Oleum's exclusive 769 Damp-Proof Red Primer.

RUST-OLEUM NEW COLOR HORIZONS SYSTEM AND SPEEDY-DRY COATING SYSTEM

Included in the Rust-Oleum New Color Horizons System of primer and high gloss top coats are colors to match your original equipment color! This system combines four important factors: (1) The ability to stop rust, (2) beautify as you protect with colors that match your original equipment, (3) durability to last and last, (4) ease of application by spray or brush.

Where unusually fast drying time (dry to touch in less than 30 minutes) is required for production or maintenance finishes, the Rust-Oleum Speedy-Dry System of primers and high gloss top coats will do the job. Send the coupon today, or contact your nearby Rust-Oleum Industrial Distributor.

RUST-OLEUM®

There are imitations, but only *one* Rust-Oleum. It is distinctive as your own fingerprint.

STOPS RUST!®

ATTACH TO YOUR LETTERHEAD

Rust-Oleum Corporation
2508 Oakton Street, Evanston, Illinois

Please send me the following at no cost or obligation:

- ☐ New Color Horizons Catalog—38 pages including actual color standards on colors to match original equipment finishes.
- ☐ Free test sample of Rust-Oleum 769 Damp-Proof Red Primer to apply over sound rusted surface.
- ☐ Nearest Rust-Oleum Industrial Distributor.

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U.S. cast iron PIPE FOR WATER, SEWERAGE AND

another "first" from U.S. Pipe

Again, U.S. Pipe takes the lead . . .

This time with the new USIFLEX® Boltless Flexible Joint Pipe, specifically designed to cut costs, save installation time and labor on costly underwater jobs.

Developed after years of research . . . and exhaustive tests . . . Usiflex pipe takes to water like a duck. Marvelously simple to install. No bolts, nuts, wrenches. Self-sealing gasket and lead lock your only accessories. And Usiflex locks bottle-tight with only moderate thrust. Once locked, it stays locked . . . cannot be dislodged when assembled or deflected.

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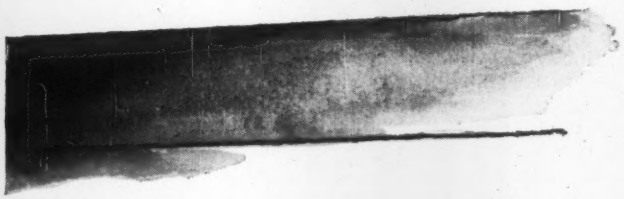


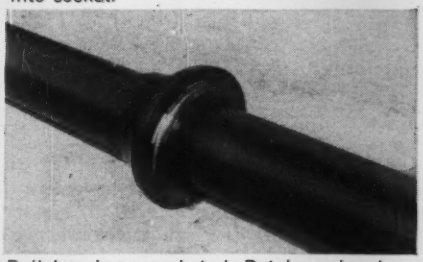
USIFLEX®
BOLTLESS FLEXIBLE JOINT* PIPE

*U. S. Patent No. 2,564,938

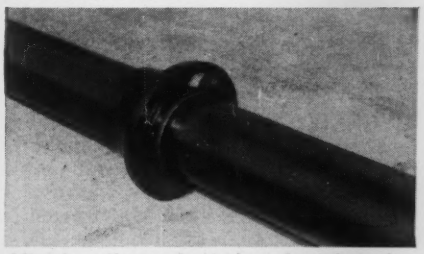
INDUSTRIAL SERVICE CAST IRON®

1 Insert the gasket in its seat in the sooket. Forming gasket loop helps initial stage of seating. Release of loop allows gasket to spring into the gasket seat where it is securely held.

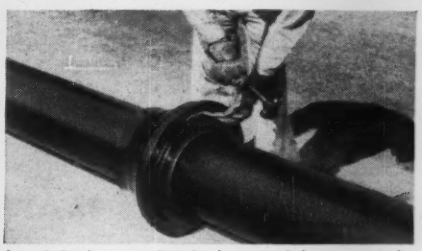
2 Apply special Usiflex lubricant to the ball and inside surface of seated gasket in socket. After lubrication, ball is ready to be pushed into socket.



3 Ball has been socketed. Retainer ring lugs have been lined up with recesses in bell and retainer ring is ready to be moved into the bell and rotated.



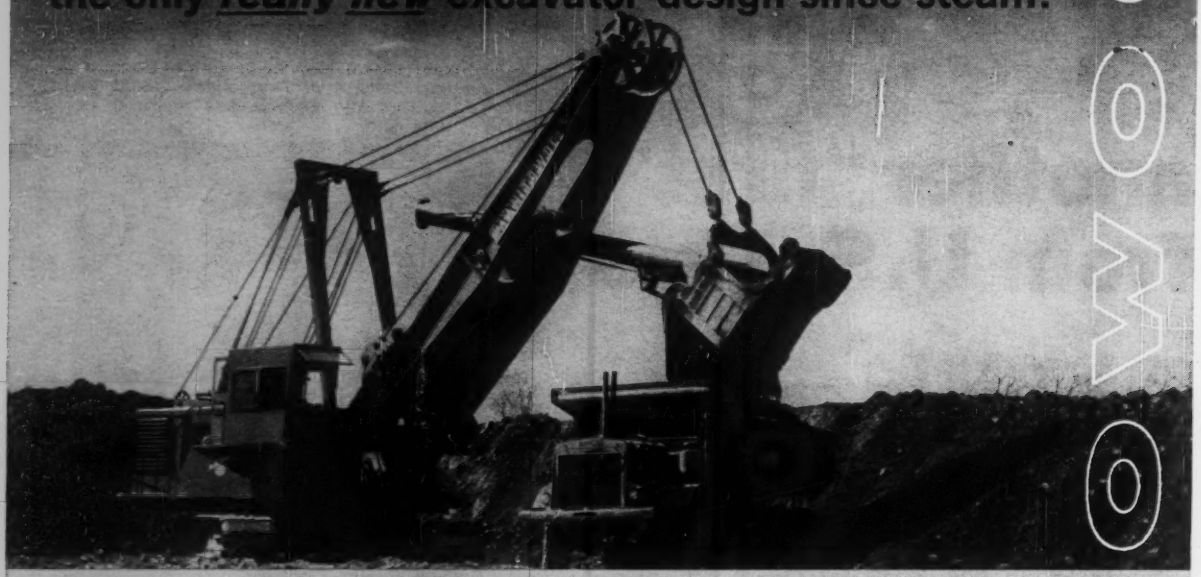
4 After insertion and rotation of retainer ring in bell, the lugs on retainer ring are in back of and in register with internal flange segments in bell. Lead lock is partially inserted into recess between the bell and retainer ring.



5 Lead lock completely inserted in recess is being caulked in place by hammer blows on a wide caulking iron.

MANITOWOC 4500 VICON®

the only *really new* excavator design since steam!



The Manitowoc Model 4500 VICON represents the most outstanding advancement of excavator design in decades. Here is a 6 yard shovel or 7 yard dragline incorporating new, tested design principles to give you more yardage in less time than any other mechanical or electrically driven shovel-drag in this size range. Thoroughly proved on the job for over three years, VICON design has increased yardage 25% or better, substantially reduced maintenance costs, and piled up more profits for owners. Some exclusive VICON features are:

INTEGRATED CONTROLS that serve both as clutch operating levers and as engine throttles, providing variable speed control over each function. Clutches, being responsive to lower range of control pressures, are engaged before engines are accelerated. Slippage and overheated friction surfaces are eliminated, lengthening clutch life appreciably.

HOIST AND DRAG DRUMS ARE INTERLOCKED to automatically synchronize their operation. Cycle time is faster and output is greater because full horsepower is always available for hoist—the operator doesn't "soak" it up with the drag brakes. Operating costs are noticeably less because brake use is cut by 50% and lining wear is drastically reduced. Another advantage of the VICON interlocked drum arrangement is that the operator can "power lower" or free-cast the bucket.

DUAL INDEPENDENT ENGINE POWER with one engine powering the main drums, and the second all other functions. Here are all the advantages of electric or conventional diesel engine mechanical drive without the disadvantages of each. You get the performance characteristics of electric drive — smoother power flow, variable independent speed control, simultaneous operation of dig, hoist, swing, and propel functions—without sacrificing mobility, without incurring the headaches and special maintenance problems of electric drive, without needing a separate power source at every job site. You get the simplicity of mechanical drive without losing valuable production time because of engine "lug down", without needing to jam clutches into engagement at high and harmful engine speeds, without the limitations of operating speeds that are inherent in conventional diesel engine drive.

Why not get the complete story on the *sensational* Model 4500 VICON today? Your nearby Manitowoc distributor has all the facts.

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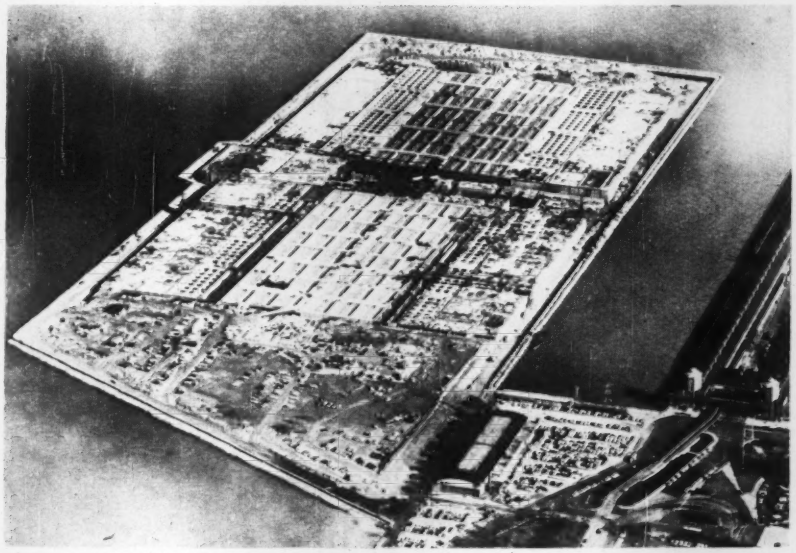
SHOVELS	CRANES	DRAGLINES	TRENCH HOES
1¼ — 6 YDS.	25 — 125 TONS	1¼ — 7 YDS.	1¼ — 3 YDS.



CHICAGO'S FILTRATION PLANT is about two-thirds complete. The $100-million installation is located next to Navy Pier and will have a rated capacity of 960 mgd.

New England

• **Boston** (water)—Metropolitan District Commission reports the $16.9-million Clinton to Marlborough water tunnel project is 40% complete. Due for September 1962 completion, the eight-mile bore will be the first link of pressure aqueduct connecting Wachusett Reservoir to the Metropolitan system at Marlborough.

• **Boston** (sewerage)—Some $60-million worth of work has been completed as part of the Metrolopitan Sewerage System improvement program. The Deer Island pumping station is ready for installation of pumping equipment.

• **Hartford** (water)—A $5-million pipeline and tunnel is 30% complete. This project is being built by the Metropolitan District of Hartford County.

• **Providence, R. I.** (water)—The city's Water Supply Board reports 35% completion on a 400x600 ft underground aqueduct storage reservoir. A $1.7-million contract was awarded early last year for the 40-million gallon unit.

Middle Atlantic

• **Baltimore** (water)—A $5.4-million contract was let last summer for construction of Section 3 of the Susquehanna Water Supply Project—the Conowingo Intake and Tunnel. Biggest part of this phase is nearly three miles of concrete-lined tunnel.

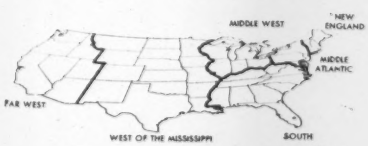
• **Buffalo** (water)—Erie County Water Authority's Sturgeon Point plant has reached 95% of completion. This $12.5-million installation was started in 1958 and will be completed this spring.

• **Buffalo** (sewerage)—The Hamburg Master Sewer District will start a $4-million program this spring that includes a treatment plant and trunk lines.

• **Clifton, N. J.** (water)—Passaic Valley Water Commission has started land acquisition for its $10-million Point View Reservoir, an off-river pumped storage impoundment.

• **Clinton, N. J.** (water)—A state-owned water supply project, Spruce Run Reservoir was started last year. Preliminary work, mainly relocation in the reservoir area highlighted last year's progress. Bids were opened this week for construction of the earth dam, dikes, spillway and channel, and appurtenances. Estimated over-all cost: $12 million.

• **Fairfax County, Va.** (water)—The county water authority's 24-mile, $3.5 million transmission system serving northerly areas and Dulles Airport will begin temporary operation next month.



The regional breakdown

• **Lebanon, N. J.** (water)—New Jersey's Department of Conservation and Economic Development started its Round Valley project in the Raritan Basin last October. Relocation contracts were let and bids will be advertised next month for most of the major work including two dams. The $24-million water supply project is aimed at a June 1964 delivery of water with a full reservoir scheduled for 1965.

• **Newark, N. J.** (water)—Charlotteburg Reservoir on the Pequannock River reached the 95% mark at year's end. Charlotteburg Dam is a 100-ft-high concrete gravity structure that will be finished this June. Over-all project cost: nearly $10 million.

• **New York City** (water)—Work on the third stage of the city's Delaware supply system, the Cannonsville Project, moved ahead impressively last year.

The 44-mile-long West Delaware Tunnel was nearly complete at year's end. An $11.7-million contract for construction of Cannonsville Dam, spillway and release water structure was let in July. Two contracts will be awarded early this year for the substructure of the intake chamber and the tunnel outlet chamber. Estimated cost: $5 million. About $4.1 million in relocation work was started at the reservoir site last year.

• **New York City** (sewerage)—The Department of Public Works is well into the final stage of its $330-million water pollution control program to provide six additional treatment plants and expand existing plants.

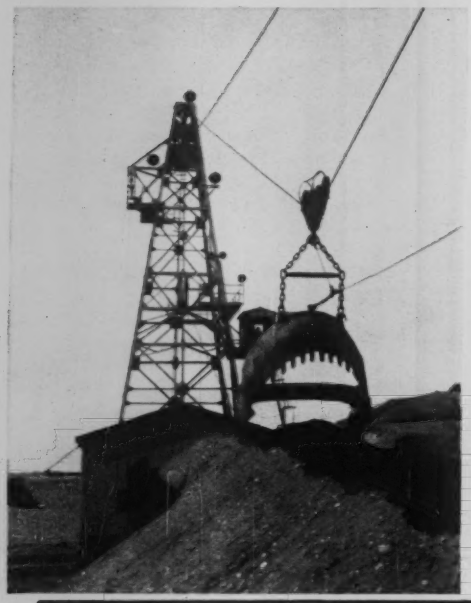
New plants and their capacities follow: Newtown Creek, 310 mgd; North River, 220 mgd; Red Hook, 40 mgd; Bloomfield, 3 mgd; Fresh Kills, 2 mgd; and Tottenville, 3 mgd. The big $120-million Newtown Creek project was about 25% complete on December 31.

• **Philadelphia** (water)—The Water Department reports $6.2 million worth of work completed up to November 30, 1960, in waterworks improvements. About $6 million in new contracts were let in the same period.

In September, second stage of the semi-automatic Queen Lane treatment plant was opened. The plant's 40 new rapid sand filters have a capacity of 120 mgd. Cost: $5.5 million. The department also opened its electronically controlled load control center during that same month.

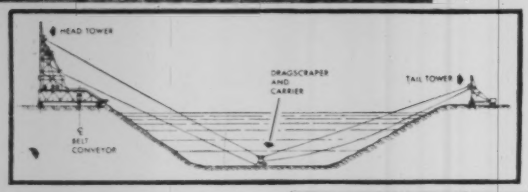
• **Philadelphia** (sewerage)—The city had completed $9 million in sewerage work

Tough Digging, Long Hauls... Routine Jobs for Sauerman DragScrapers



240-Ft. Bank... 350-Ft. Haul

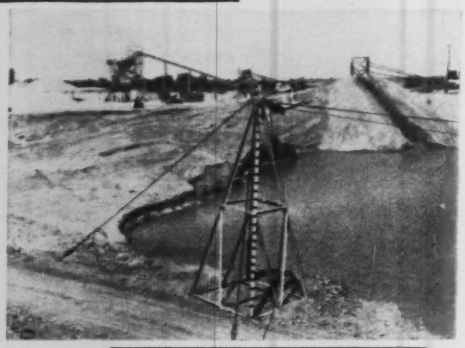
This mobile Sauerman Tower Excavator digs 480 yds. per hr. on an average haul of 350 ft. from a high bank to a portable field hopper. The 12-yd. Crescent DragScraper operates between steel head and tail towers. The towers are mounted on two sets of railroad tracks and ride on four sets of trucks. DragScraper power is supplied by two hoists mounted on the head tower. One hoist operates the load and pullback cables, the other is used to tension the track cable. The hoists are controlled by one operator located in the cab on the tower. The load cable handles over 400,000 tons of material before replacement.



Drawing shows typical mobile tower excavator digging in wet pit.

75 Ft. Under Water... 800-Ft. Span

A 5-yd. rapid-shifting DragScraper supplies about 200 yds. per hr. to the plant hopper in background. Bridle tower in foreground is one of two supporting the bridle shifting cable which is controlled by the third drum of the Sauerman hoist. Lateral shifting of the DragScraper's line of operation is readily accomplished by power-shifting the trolley and tail block to a new position on the bridle cable. The DragScraper is digging 75 ft. under water and the operating span is 800 ft. from head frame to the bridle towers. Over a million tons have been excavated from this pit. The DragScraper often operates 24 hrs. a day to handle contract demands.



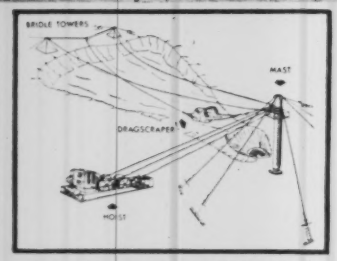


Diagram shows details of Sauerman rapid-shifting DragScraper.

Sauerman machines dig and haul in one continuous operation . . . work on high bank, dry pit or under water . . . handle most bulk materials. Consult Sauerman engineers about your job. We will promptly supply appropriate literature.

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at the end of November, 1960. More than $11 million in contracts were in force at that time, while $8 million worth were let in the eleven month period.

• **Trenton, N. J.** (sewerage)—This city's $5.3-million treatment plant was 80% complete at year's end. June of this year should see completion of the 20-mgd installation.

• **Washington, D. C.** (water)—Start of construction on the $9-million Dalecarlia Filtration and Chemical building, under a contract awarded in 1960, rounds out the current phase of the Corps of Engineers' water supply program for the nation's capital. No major contracts are planned for this year.

The Washington Suburban Sanitary Commission laid the cornerstone in October for its nearly completed Potomac River Water Filtration plant at Rockville, Md.

• **Washington, D. C.** (sewerage)—Congress appropriated $25.2 million for overall construction of the 41-mile Potomac Interceptor to serve the new Dulles International Airport and tributary areas in Virginia and Maryland. Awards are planned this March for $5 million and $2.5 million sections, followed by May-June awards of about $4 million each and smaller awards soon thereafter to put 35 miles under construction by September.

• **Yonkers, N. Y.** (sewerage)—Over-all completion of this joint Westchester County and City of Yonkers treatment plant became official this month. The $15-million plant was started in 1956.

South

• **Atlanta** (water)—Early last year the City of Atlanta completed its $10-million Chattahoochee Water Treatment System which includes four pumping stations, four purification plants, and two terminal reservoirs.

• **Birmingham** (water)—A 34.5-mile long steel pipeline is 38% completed and is the major part of the $22.8-million Sipsey System. Surge tanks and a control reservoir are finished, while the cast iron, in-city distribution system is 95% complete.

• **Jacksonville** (water)—A $15-million sewer system to serve about 10,000 homes is nearly completed. An interceptor system including nearly 40,000 ft of 30 in. to 84 in. concrete pipe will be serviced by a new treatment plant.

• **Louisville** (sewerage)—A 104-mgd

NOW... your crane can drill holes, too!

CALWELD DRILL
crane attachment

- **Mounts on any crawler or truck crane in 30 minutes.**
- **Digs holes 1′ to 10′ diameter and as deep as 200′.**
- **Drills up to 60′ per hour.**

Now, you can get all the Calweld big bore, fast drilling features and still use your crawler or truck-mounted crane for normal duty when needed. Because the new Calweld crane attachment is a completely self-contained unit, it can be mounted in 30 minutes on any standard ¾ ton crawler or 1 yd. truck mounted crane, ready to dig clean holes fast and straight without manual digging or extra finishing. Now available in three sizes . . . Model 150 B, 150 C, and 150 CH.

All models contain their own power units, and operate independently of the crane power to dig holes from 12″ to 120″ in diameter. Hydraulic controls are mounted in the crane cab for easy, one-man operation. The average crane man can operate a Calweld without previous training or experience.

Hydraulic drill positioner and boom stop combination also provide for slant hole drilling to a 1 to 3 batter with positive accuracy. Hydraulically-operated kelly drive yoke acts as kelly crowd and adds to the crane's capacity for pulling casings.

Telescoping and triplescoping kelly bar permit drilling to 150′ deep without extra drill stems. Drill buckets and attachments of various types are available for fast drilling under any conditions.

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CALWELD DRILLS

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Los Angeles 22, California

pumping station was completed last year as part of the Louisville and Jefferson County Metropolitan Sewer District's $5.4 million in improvements completed. Another $3.2 million in projects got under way during 1960, while nearly $5-million worth will start this year.

• **St. Petersburg** (water)—Bond sale early this year will pave the way for $14 million in water extensions. Nearly $8 million of this amount is set for trunk lines from the city's well field 35 miles away.

Middle West

• **Chicago** (sewerage)—Contracts totaling $4.9 million were awarded last year by the Metropolitan Sanitary District of Greater Chicago for additional construction of its wet oxidation plant at the West-Southwest Treatment Works. Contracts were also awarded for $1 million for large diameter sewers. About $5 million worth of sewers and $10.4 million of treatment works were completed last year. Sewer contracts totaling $2 million will be awarded this year.

• **Chicago** (water)—At year's end the 960-mgd Central District filtration plant at Navy Pier was 64% completed. Contracts totaling $7.5 million were awarded and $10.9 million of contracts were completed. The $100 million plant will be completed early in 1962. Contracts totaling $23.8 million will be awarded this year.

• **Cincinnati** (water)—A $1-million chemical building at the city's treatment plant is about 30% complete and should be finished by early 1963. Another $2.6 million in water main construction got under way last year as part of a $30-million, seven-year program.

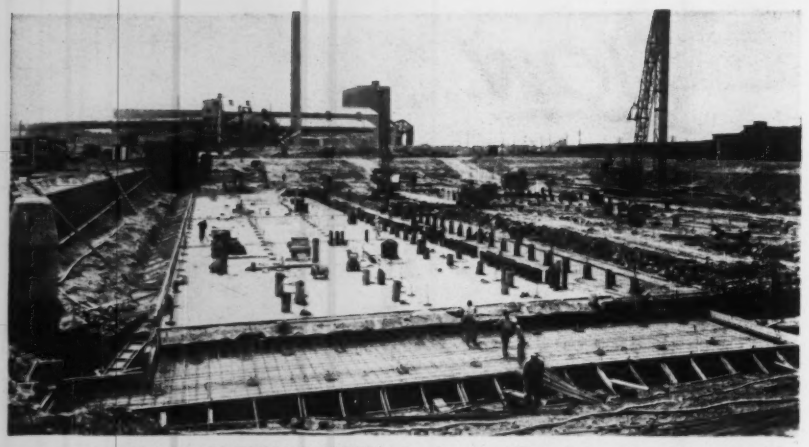
• **Cincinnati** (sewerage)—The Mill Creek disposal plant was completed last February as the last phase of a $5-million program. Additions to the Mill Creek Interceptor costing $8.5 million were started during the past year.

• **Detroit** (water)—The city kicked off its $33-million expansion program with the award of contracts totaling $1.2 million for a water line across Red Run Drain in Macomb County. Roughly five miles of 48-in. to 54-in. pipeline is included in this initial phase.

Wayne County let a $17-million contract for construction of a water treatment plant and pumping station in Allen Park. Work got underway last October and is set for completion in the fall of 1963.

• **Milwaukee** (water)—The Texas Avenue intake has been completed at a cost of $3.5 million. The 7,544-ft concrete line is 9 ft in diameter and will hook up with a $2-million, 100-mgd pumping station set for completion this September. Ultimate capacity of both is 300 mgd of Lake Michigan water.

Another $3.5-million contract is under way for 18,000 ft of seven-ft-dia lines to be finished in December. This job is 22% complete while a $5.8-million purification plant is 10% along.



PRIMARY SEDIMENTATION TANKS take shape at Detroit sewage treatment plant.

West of Mississippi

• **Dallas** (water)—Iron Bridge Dam and Reservoir on the Sabine River were completed in November. The $19-million project includes an earthfill dam that will impound 930,000 acre-ft. Also part of Dallas' $45-million water program, the Sabine Pump Station, was completed last year. Cost: $1.5 million. Lake June Reservoir was completed and a $1.7 million pumping station started there.

• **Dallas** (sewerage)—A $2.3-million addition to the White Rock Sewage Treatment Plant on the West Fork of the Trinity River will be ready for bid opening next month. Completion target is fall of 1962.

• **Abilene, Tex.** (water)—A $3.5-million contract was let last month for construction of Hubbard Dam by the West Central Texas Municipal Water District. The dam is a major part in a $14.4 million program set for over-all completion in 1965.

• **Minneapolis-St. Paul** (sewerage)—Bloomington, Minn., south of the Twin Cities, is better than half finished with an $18-million sewerage system.

• **Omaha** (sewerage)—A $2-million enlargement of the Papillion Creek treatment plant was completed last fall.

• **St. Paul** (water)—City water department spent $2.5 million last year bringing its $21.5-million to the 80% mark. Biggest project was a 4.5-mile, 90-in. supply line from Lake Vadnais to the filtration plant.

• **St. Louis** (water)—Due for a start in the late spring, a new coagulent facility for the Chain of Rocks Purification Plant will cost about $1.2 million, according to the city's Water Division.

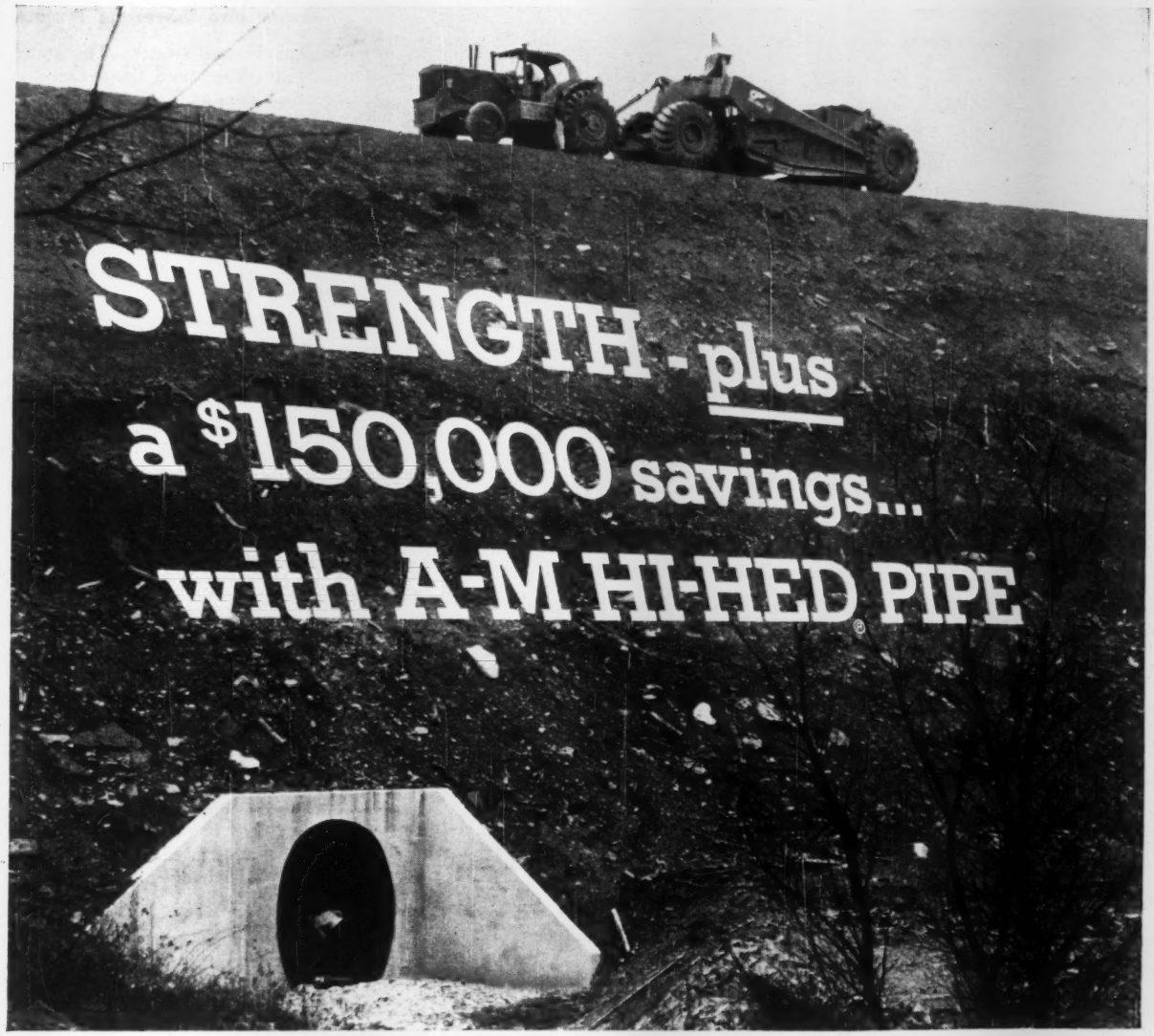
Far West

• **Billings, Montana** (water)—Bids were opened in November for the Billings Heights water supply and distribution system expected to cost nearly $2 million. A bond issue for that amount was approved by voters last July.

• **Boise, Idaho** (sewerage)—This $4-million sewer, known as the Boise Bench System, was 80% complete at year's end. Started in 1959, the sewerage is expected to be ready for limited use this coming May.

• **East Bay Municipal Utility District** (water)—EBMUD's $283-million, 10-year development program moved into high gear during 1960. Progress at year's end follows: The $68-million Third Mokelumne Aqueduct is about one-third complete; Briones Dam and Aqueduct, costing $14.4 million, was started in December; design contract for $38-million Camanche Dam was let last summer and construction is due to start early next year; Laffayette Aqueduct No. 2 was also started last month —its cost $5.3 million; the $5-million Laffayette Tunnel No. 2, started a year ago is 24% complete; over $5 million worth of reservoir modernization and filter plant enlargement is nearing completion in the EBMUD system.

(*Continued p.* 100)



STRENGTH was the first requirement for a 4,000 foot drainage structure under the new east-west runway at Greater Pittsburgh Airport. Precast concrete Hi-Hed pipe provided this essential strength (50% stronger on the average than equivalent size round pipe), plus a big bonus in the form of an estimated saving of $150,000—approximately 18% savings over competitive material.

Versatile A-M Hi-Hed Pipe is designed for minimum vertical load and maximum lateral support . . . saves trench width in congested areas . . . is readily available in sizes up to 144″ round pipe equivalent from plants strategically located throughout the nation. Write today for illustrated Hi-Hed brochure.

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AMERICAN-MARIETTA BUILDING
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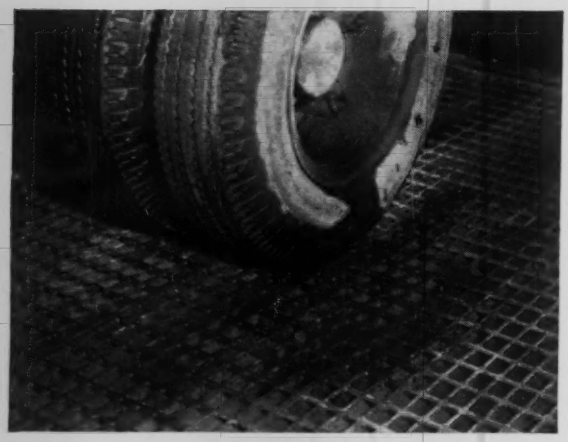
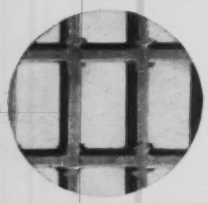


Heavy mobile loadings call for Gary HEAVY-WELD STEEL GRATING



Advanced design of Gary Heavy-Weld Gratings makes them ideal for any installation where heavy-duty open steel flooring is desirable. New design has the capacity to sustain heavy mobile loadings imposed by highway vehicles, lift trucks, and all classes of aircraft. Straight clean lines of the rectangular pattern permit unimpeded flowage and afford maximum open area. Wide range of sizes and meshes makes Gary Heavy-Weld Gratings adaptable for a variety of applications.

- Airfield drainage covers
- Industrial floor openings
- Aggregate screens
- Highway inlets & trenches
- Vehicular ramps
- Trash racks
- Scrubber trays

A New Catalog has a unique series of charts for use in determining the exact size and type of Heavy-Weld Grating for your particular application. Handy tables simplify the problem of specifying exactly the right grating for every load requirement. For your free copy of catalog No. H-760 write today to Dept. A-17.

ROCKWELL-STANDARD CORPORATION

Grating Division, Gary, Indiana

. . . Water and Sewerage Projects

• **Molokai, Hawaii** (water)—The state's Division of Water and Land Development announced a holing through of the 27,000-ft-long water tunnel.

• **Honolulu** (water)—The Board of Water Supply reports its $7-million expansion program is 40% complete. Four wells, a pumping station, a reservoir, and 20 miles of pipeline were underway last year. Overall completion target: 1962.

• **Southern California** (water)—The main line of the Colorado River Aqueduct was completed last May and can now deliver up to 1.2 million acre-ft annually. Two feeder pipelines will be started this year. Total cost: $9.6 million.

• **Los Angeles** (water)—The city Department of Water and Power plans an $80-million outlay in new construction during 1961. About $57 million of this is for a steam generating plant, but in the water field DWP began a $3.4-million expansion of Encino Reservoir that will triple its present 3,000 acre-ft capacity.

• **Sacramento** (water)—By summertime the city will have let contracts on a $10.5-million, 60 mgd filtration plant.

• **Salt Lake City** (water)—Salt Lake Metropolitan Water District completed and dedicated its $7.5-million Little Cottonwood Filtration Plant during 1960.

• **San Diego** (sewerage)—Last month the city kicked off a $51-million sewerage program to be carried out over the next two years. It involves these key features: a $7.5-million primary treatment plant; a $24-million, 12-mile interceptor; and a $6-million, 13,000-ft ocean outfall.

• **San Diego** (water)—The San Diego County Water Authority dedicated the $30-million Second San Diego Aqueduct last December.

• **Seattle** (sewerage)—A long-term investment in a sewage disposal system for Metropolitan Seattle is getting underway. It will cost $134 million and take 10 years to build. First construction is due to start this year on two pumping plants, a $7.5-million tunnel, and $6 million worth of interceptors.

• **Seattle** (water)—Started in 1959, the city's Tolt River development is now 50% complete. A 20-mile, 60-in. pipeline is 75% complete but work on the 200-ft-high earthfill dam is behind schedule. Completion target for the project: early 1962.

THE NEW GIANT FOR INDUSTRY...
THAT STANDS WAIST HIGH TO A GROWING BOY!

NEW BLOOD BROTHERS "150WB" UNIVERSAL JOINT

HAS AN ULTIMATE YIELD OF 600,000 INCH POUNDS OF TORQUE... WITH A SWING DIAMETER OF ONLY 13½ INCHES!

The boy in the picture is holding one of Blood Brothers' smaller universal joints to show the relative size of its giant new "150WB." One of the largest universal joints ever built commercially, it will adequately handle 162,000 inch pounds of torque using a safety factor of 10 to 1 . . . in a swing diameter of only 13½ inches! The "150WB" was designed for compact installation in such operations as rolling mills, gantry cranes and ship drive shaft applications. In spite of its size, this giant unit may be assembled or disassembled by removing 4 bolts.

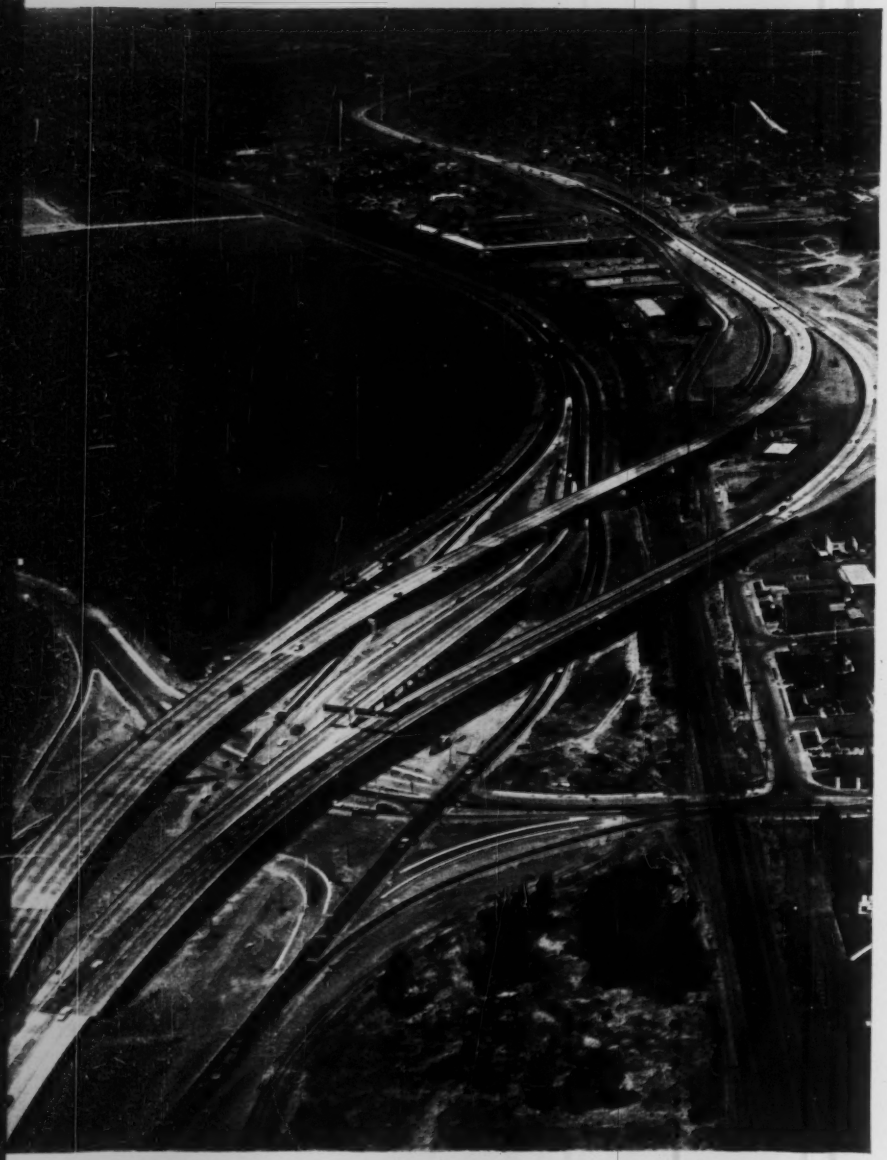
The "150WB" proves again that you can get the exact universal joint you need from one source . . . anything you need from a simple assembly built to handle 350 inch pounds of torque, to the "giant" in the industry. Whatever your requirements, either a standard item, or an unusual design for a special application, Rockwell-Standard engineers can meet your specifications . . . at a considerable saving in cost. Write or call for complete details today!

Another Product of...

ROCKWELL-STANDARD
CORPORATION
Universal Joint Division, Allegan, Michigan

Coming: Changes in National Policy,

- **Watch for increased activity at all levels of government to solve commuting problems, reform transportation agencies.**
- **Decisions on financing to be made this year will determine whether or not the Interstate will be completed on schedule.**



INTERSTATE faces this vital question: Will the 41,000-mile system be finished in 1972 as planned, or will financing problems force a stretch-out.

Change is in the air in 1961. Demand is growing at all levels of government for a long-overdue hard look at a coming "crisis" in transportation.

Watch the new Administration for activity along these three lines: Grants for planning urban transportation and loans for rapid transit systems; wide reforms in function and administration of federal regulatory agencies; and attempts to coordinate all federal transportation policies, possibly under a cabinet-level department of transportation.

You will also see more attempts in the cities to coordinate planning of rapid transit and highways. A high level of inter-agency cooperation is providing such an approach in some cities; in others, much remains to be done to achieve understanding among engineers, planners, economists, sociologists and others concerned with one or more forms of transportation and its effects.

For the Interstate highway program, this is the year of decision. The long-anticipated highway cost allocation study report has been submitted to Congress, as has the revised estimate of cost for completing the Interstate. These reports provide a basis for solution of highway financing problems.

Congress must now make a basic decision on scheduling. Should the program be stretched out, completed within the 13 to 15 years originally established by the Federal Highway Act of 1956, or should it be accelerated?

If the system is to be completed on time, Congress this year will have to find additional revenue. The 1956 estimate of the federal share in the cost of the Interstate was about $25 billion; today's estimate is about $37 billion.

The temporary one-cent tax on gasoline imposed in 1959 is scheduled to expire on June 30. And on that date revenues for excise taxes on new automobiles and automotive parts and accessories will be diverted from the general fund into the Highway Trust Fund.

The problems of urban transportation have intensified to the point where 1961

Key Decisions on the Interstate

may see the beginning of a solution. The choices in the urban transportation problem are not nearly so clear cut as those involved in Interstate financing—they are enmeshed with and inseparable from other urban problems. The plight of commuter railroads, operating losses on rapid transit lines, failure of expressways to solve urban transportation problems by themselves, the parking problem and other factors all focus attention on government activity.

Here, in capsule form, is a review of major accomplishments in 1960 and trends for this year for all forms of transportation.

• **Highways**—Solid progress was racked up during 1960, the second biggest year in history in terms of dollar volume of contract awards. This year will set a new record, with a total of at least $3.9 billion in prospect for contract awards for highways and bridges.

• **Bridges**—Several notable bridges in both steel and concrete were completed in 1960, and others started. The single largest bridge contract in the U. S.—the $320-million bridge over the Narrows at the entrance to New York harbor—is progressing on schedule.

• **Airports**—Major effort continues on modernization of major airports to handle increasing numbers of jet aircraft. This year may see an expanded federal-aid airport program, with emphasis on navigational aids and traffic control measures, spurred by the recent mid-air collision of planes approaching New York City airports.

• **Rapid Transit**—Proposals for new or expanded rapid transit systems in Los Angeles, San Francisco, Washington and other major cities stirred controversy during 1960; discussions will continue unabated this year. Philadelphia is successfully subsidizing certain high-speed commuter lines.

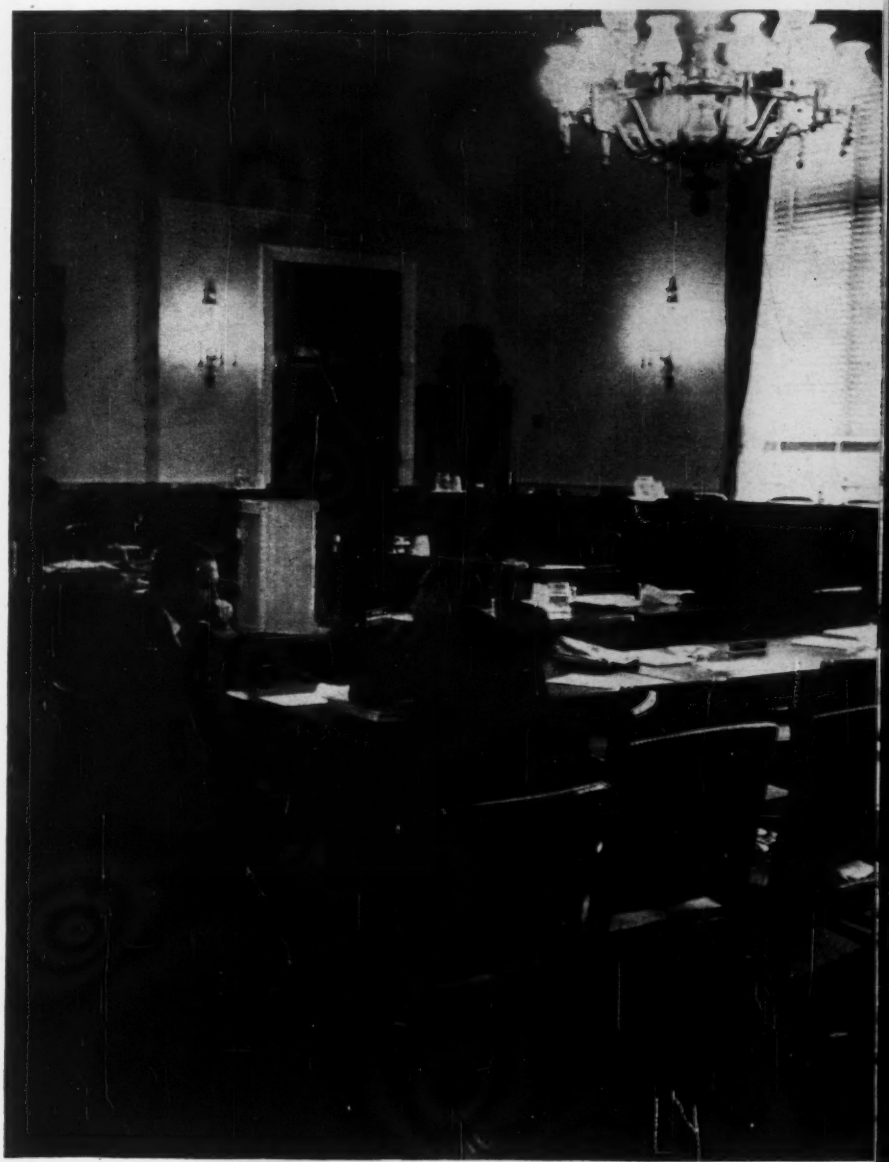
• **Railroads**—Maintenance and operating problems held the spotlight in 1960. Major construction effort is a relocation of the Southern's line near Anniston, Ala. Prestressed concrete ties are being tested on both coasts.

• **Waterways**—With the St. Lawrence Seaway in full operation, emphasis now is on modernization and expansion of cargo handling facilities at major coastal and lake ports. Notable is work being done at New York City, Chicago and Los Angeles. New Orleans is digging a 70-mile, $110-million ship channel to the Gulf of Mexico.

• **Pipelines**—1960 was the biggest year ever for pipeline construction in the U. S. and Canada. Through November, pipeline contract awards totaled about $625 million, topping a previous yearly high set in 1950. A high level of activity is expected for 1961.

• **Missile Bases**—The construction program for ICBM's hit its peak last year with awards for 12 bases. The Pentagon has selected all the sites scheduled for Atlas and Titan.

• **Interstate scrutinized**—For highways, 1960 opened (and closed) with a drum-fire of criticism of the Interstate program and its administration. Rep. John A. Blatnik's subcommittee on



NATIONAL POLICY on transportation will be hammered out this year inside the new Administration, possibly along the lines of reports already in.

highways staged three investigative hearings during the year—one on clearances for bridges on the Interstate system, another on the Oklahoma road scandal, and a third on payola and other misdoings in Florida. This year will see more of the same as the battle over highway financing is joined.

While trying to dodge the brickbats, highway agencies chalked up a solid record of accomplishment. Spurred on by early allocation of federal-aid funds for fiscal 1962 and easing of BPR's contract control restrictions, contract awards reached more than $3.4 billion, second highest in history.

By the end of 1960, more than 10,000 miles of Interstate highways were open to traffic, nearly one-quarter of the complete system. More than 4,500 miles are under construction, with engineering or right-of-way acquisition under way on 10,000 more.

Nor are other segments of the nation's highway system being neglected. Since 1956, construction contracts have been completed on more than 106,000 miles of ABC roads. States and local agencies have completed work on many more miles with their own funds.

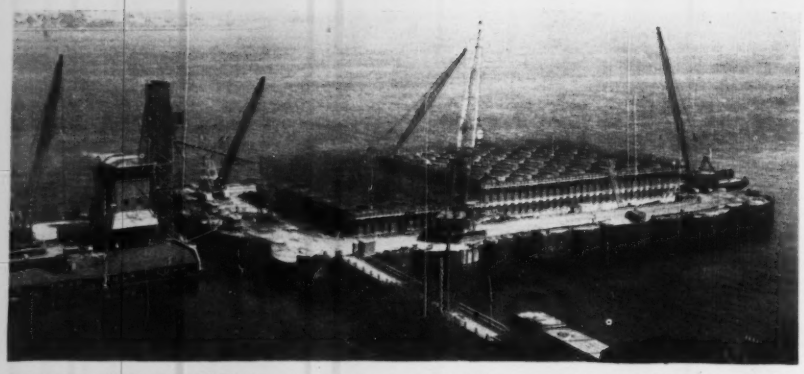
Last summer, Congress approved $925 million per year for ABC projects during fiscal 1962 and 1963; this is the same rate of expenditure as for the current fiscal year.

• Administration tightened—Stirred by activities of the Blatnik committee and a generally unfavorable press, the Bureau of Public Roads, individual highway departments and the American Association of State Highway Officials moved to tighten administrative controls. In May, BPR directed its field engineers to tighten project controls, including double checks on material tests and reports, quantity measurements and quality of work. Late in the year, AASHO entered the field of contract management for the first time with approval of a new "Information Guide" for project procedures.

Haunted by the specter of greater federal control, state road men can be expected to further tighten nuts and bolts in their administrative machinery.

Notoriously weak—on the average—in public and press relations, highway agencies and associated trade groups in 1960 faced squarely the necessity for stepped-up selling of the highway program. After a faltering start, the Better Highways Information Foundation and its affiliated state groups began a concerted effort to tell the highway story.

Last year marked a milestone in the annals of highway research with completion of the $23-million AASHO Test Road at Ottawa, Ill. Comprehensive results of the test will become available to engineers in the next few months.



TOWER PIER CAISSON marks progress on the Narrows Bridge—world's longest suspension span—over the entrance to New York Harbor.

In a surprising resurgence of toll roads, five states—Kentucky, Florida, Oklahoma, Delaware and Maryland—took definite steps toward completion of more pay-as-you-ride highways. A 120-mile extension of the Kentucky Turnpike into eastern Kentucky is scheduled for early completion. In the western part of the state, work is scheduled to begin on a 43-mile toll road from Winchester to Campton. Projects in the other four states are still in the planning stage.

Use of consultants in the highway program continued to decline during 1960. Total expenditure by state highway departments for consulting services was estimated at about $44 million last year, a drop of 31% from 1959. Little change is expected in 1961.

• Competition eases—For contractors, 1960 was another rough year—keen competition, low bid prices and low profit margins. For highway agencies—and the public—it was a year for price bargains, as bids ran consistently below engineers estimates in many states.

Now, however, the profit outlook for contractors is the best since 1956. This year may see highway builders climb out of the "profitless prosperity" that has frustrated many of them for the last four years.

Primary reason is a slight slackening in competition as the volume of contracts rises. Competition remains keen, but it was not quite so rough during the late months of 1960 as earlier. Principal indicator is the fact that bid price indexes over the country have risen slightly in recent months. Contributing factors are general stability in material prices and somewhat easier borrowing to finance contractor operations. Ready availability of materials, manpower, machinery and money should make it possible for contractors to stick to fast production schedules, reduce time requirements and increase profits.

• Equipment improves—Low unit prices bid by contractors reflected improvements in equipment and methods in 1960. Highlights included:

- Development of a powered inflation device for changing tire pressures on a pneumatic-tired roller "on-the-run."
- Continued improvement in automation and mobility of asphalt mixing plants. Central batching plants for concrete also are becoming more automatic in operation.
- Introduction of a simple gage to measure accurately the energy output of a diesel pile hammer.
- Testing of one of the largest bulldozers ever built—a 750-hp, twin-engine unit.
- Application of hydrostatic drives to construction equipment, on a research and development basis.

The year will bring additional improvements in equipment as manufacturers compete for the construction market and contractors strive to do work faster and more economically.

• Materials, methods improve—Last year, new ideas in material included use of neoprene, asbestos and epoxies in asphalt paving mixtures; hinged wire fabric for cement concrete pavements; aluminum sheet for culverts; and refinements in design of corrugated metal culverts to make possible the use of thinner gage metal and greater culvert diameters.

For the highway engineer, the most important development probably is the continuing application of high-speed computers—used in conjunction with aerial photogrammetry in some cases—to speed planning, location and design procedures. Not only are thousands of man-hours saved in making repetitive calculations, but the engineer is permitted to examine a much wider range of alternate design and location than ever before, with resulting cost savings.

(*Story continues p. 109*)

Profit-Preview...

Here's the equipment you'll see on the

MONEY-MAKER JOBS IN 1961

You'll see TOP profits earned on jobs working LW Tandems

Introduced just a year ago, Le-Tourneau-Westinghouse "2-loads-per-trip" Tandems are now being used in every kind of material, and on short hauls as well as long. With good reason: by operating *two* scrapers behind a Tournapull® or Speedpull® prime-mover you *double* your load capacity at *only* ⅓ extra cost for the second scraper. Job use also proves that: you can add or take off the second scraper in *minutes*, to meet changing job conditions . . . you turn, back up, and maneuver as simply as with single scrapers, and in almost the same space. Visibility is *excellent*, of both loads, both aprons, and pusher.

ONE pusher is all you need, and it can be the same size you'd use with ONE scraper-operation! Investigate tandems (18 to 58 yds) . . . LW engineers will help you figure how they will "prove out," and in what tandem combination, on jobs you'll be bidding in 1961.

LE TOURNEAU LW WESTINGHOUSE

For more previews of the 1961 profit picture, turn page.....

1961
Profit-Preview...

You'll see V-POWER TOURNAPULLS®

...like this all-purpose C 'Pull* ..."hottest" scraper on the market

V-Power C 'Pull, with 270 hp, 27-mph speed, saves time on *every* phase of its cycles. Main reason: a 20% better power-to-weight ratio than average in its size-class! Other reasons: fast-loading Fullpak® scraper (14 yds struck, 20 yds heaped) . . . smooth-shifting, wide-ranged step-gear transmission . . . instant-response electric steer and scraper control . . . LW Power-transfer differential. Easiest of all earthmoving machines to maintain. Add on second scraper any time for LW Tandem operation . . . or interchange scraper with 22-ton LeTourneau-Westinghouse Rear-Dump.

*Trademark

On long-haul jobs you'll see SPEEDPULLS®...

There's a good reason for C Speedpull's high production on long-haul projects. With 276 hp, it has the best power-to-weight ratio in its size class . . . power for *fast* acceleration . . . power to operate *two* 20-yd Fullpaks in tandem. 37.7 mph speeds. Hydrair® suspension levels the ride, eliminates need for front axle. No troublesome axle "dozing" action. LW Power-transfer differential keeps you moving over rough grades, wet, slippery footing. Positive power-steer for quick turns, easy maneuvering. Result: you move *more* earth at lower cost!

setting new yardage records in 1961

...and the big-production "B", top money-maker of them all!

Best combination of *price, capacity,* and *power* available in big scrapers. GM 12V-71 engine delivers 430 "horses." With extensive use of super-strong but lightweight steel, this gives you a low 320:1 power-to-weight ratio, WAY ahead of the industry. Result: you get more "snap," faster positioning, easier loading, high-ball hauling... *higher production no matter how tough the job.* Powerful enough to operate TWO 29-yd scrapers in tandem; low-cost enough to prove-out dollar-wise with *any* combination of 20 or 29-yd scrapers, or with interchangeable 35-ton Rear-Dump.

...and on any job, economy-size D 'PULLS

The 143-hp D 'Pull, with 9-yd scraper or 10-yd Hancock elevating scraper (shown), is probably the most useful earthmover built. On *big* yardage contracts, you'll see the "D" on finish, shoulder, and clean-up jobs. On *small*-yardage work, it can be roaded without permit, work by itself. With Hancock scraper, you do *not need* a pusher to get heaped loads. Scrapers interchange with 11-ton Rear-Dump.

For more profit-previews, turn page...

1961 Profit-Preview, continued...

On every size and type of job you'll see...

"Go-Anywhere" LW Tournatractor® ...with 218 hp, 18.5-mph speed

Rolling on big rubber tires, mobile Tournatractor is on the job, *producing*, before you can load a crawler tractor on a low-boy! It *works* fast, too, with non-friction drive for acceleration pep, with sharp-turn maneuverability, and a torque-converter transmission speeding *every* operation. Power? In speed ranges where most tractor work is done, it matches big crawlers in rimpull, pound for pound. New: *choice* of Tournatractors, with electric or hydraulic blade control.

"Go-Power" LW Graders...7 sizes from 85 to 190 horsepower

More proven performance-advantages than any other grader on the market! Strongest frame built, with high arch for more blade clearance . . . 63″ circle and *positive* blade control . . . 8 forward speeds, 4 reverse, 3 optional creepers for maximum power application (two torque-converter POWER-*Flow*® models offer *infinite* speed ranges) . . . GM or Cummins engines . . . full-sweep visibility of both blade-ends and road ahead . . . and a *wide* range of profit-boosting attachments, including Preco automatic blade control.

HAULPAK®: the truck you can tell is built by a construction-equipment manufacturer

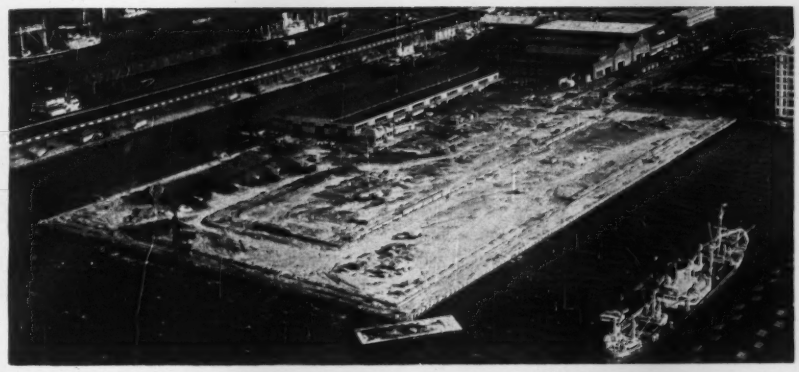
Designed to *earthmoving* "specs," not automotive! You get: LW Power-transfer differential . . . traditional Tournapull ruggedness in frame, axles, bull-gears, etc. *New* ideas, too: "no-spring" Hydrair® suspension . . . deep V-bowl that carries *more* load *lower* for best stability . . . built of steel 3 times stronger than standard, yet ⅓ lighter. You haul much more payload than Haulpak weighs! 5 sizes, 22 to 60 tons, for *lowest net cost per hauled ton* on every job.

LeTOURNEAU-WESTINGHOUSE COMPANY • PEORIA, ILL.

Litho in U.S.A. P-2400-DC-4

Last year saw the development of a high-speed photographic technique for making pavement condition surveys; the method was used at the AASHO Test Road. Plans for prestressed concrete paving at Fairchild Air Force Base have been abandoned, but an additional section of continuously reinforced concrete pavement was built in Maryland. Emphasis in bituminous paving design was—and will continue to be—on more careful control and higher quality.

In 1960, there was a definite swing toward closer cooperation among state highway departments and other agencies in the location and design of urban expressways. There are notable examples of cooperation in solving transportation problems in Chicago, Kansas City, Pittsburgh and Philadelphia.



BROOKLYN PIER is being built at cost of about $9 million for lease to a Japanese shipping line. It is part of a five-year, $200-million rebuilding program.

• **Rapid transit rediscovered**—Recognition of both the assets and shortcomings of expressways lead to notable stirrings of interest in rail rapid transit in a number of cities. In Los Angeles, consultants recommended a 74.9-mile system—mostly elevated—that would accommodate high-speed rubber-tired trains at a cost of more than $500 million. A billion-dollar bond issue to provide San Francisco Bay area residents with a 98-mile transit system has been postponed; it probably will be submitted to voters in 1963.

Chicago, which put a rapid transit line in the center of the Congress Expressway, provided space for fixed-rail transit in the median of the newly opened Northwest Expressway.

A New York City consulting engineer has proposed a $210-million, high-speed rail system to serve commuter belts in New York, New Jersey and Connecticut.

Philadelphia, a leader in providing subsidies for commuter rail lines, is extending its support to roads serving three suburban areas.

Congress last year took no action on a bill to establish a $100-million loan program to help urban areas improve mass transportation and to provide grants for urban transportation planning. But a similar proposal awaits action of the 87th Congress and prospects for its passage are regarded as better this year than last.

• **Coordination promised** – Highway engineers, city planners, transit officials and others moved a step closer to mutual understanding during a three-week study conference held last August at Woods Hole, Mass. Solution to the country's transportation problems, said the group, lies in "better research, planning and policy-making."

James Landis, adviser on regulatory agencies to President Kennedy, may gain responsibility for development and coordination of a national transportation policy. Working out of the White House, Mr. Landis may be assigned direct supervision of the Bureau of Public Roads. If he is given this role, Mr. Landis may be expected to strengthen coordination of federal-aid highway plans with approved metropolitan transit plans and to undertake a restudy of the entire field of transportation user changes.

• **Record to tumble**—A number of notable bridges were completed in the U. S. last year. Still abuilding is the world's longest suspension bridge—the $320-million crossing over the Narrows, the entrance to New York harbor. And a start was made on the 17¼-mile bridge and tunnel crossing of lower Chesapeake Bay, a long-time dream finally beginning to come true.

Bridge designers continue to emphasize weight reduction with adequate strength as a means of reducing costs. This has lead to the increased use of high strength alloy steel and orthotropic plate designs. Use of welded steel highway bridges is growing.

Prestressed concrete continues to gain in importance as a material for highway bridges. The longest prestressed concrete span in the U. S. was completed in 1960. It is the Lake Oneida Bridge in New York state, with 320-ft clear center span. Last year marked the completion of the three-mile Pensacola Bay Bridge, composed principally of a large number of repetitive 60-ft spans supported on prestressed piles.

• **Airports to modernize**—Emphasis in airport construction continues to be on modernization and expansion of landing area facilities to accommodate jet aircraft. Major effort has been—and will be—concentrated at existing major terminals.

Airport construction may be speeded this year if Congress approves a stepped-up program of federal aid; proposed legislation would provide $100 million per year of federal funds, to be matched locally. Current program provides $65 million per year in federal aid.

The most disastrous mid-air collision in history, which occurred over New York City last month, heightened interest in the airport program. Current thinking calls for (1) better navigational aids and traffic control devices and (2) possible dispersion of airport sites in major metropolitan areas.

• **And now, Minuteman**—An all-time high in contract awards wasn't the only thing to distinguish 1960's ballistic missile base construction program. Lagging work at several bases resulted in a shake-up of Corps of Engineers and Air Force administration of the program.

This in turn, resulted in a prequalification system for contractors wishing to bid for ICBM jobs. Through it all, union jurisdictional disputes endangered schedules at many bases.

No more bases for the Titan or Atlas intercontinental ballistic missiles are in sight. As things stand now, the only missile bases to be built will be for the new Minuteman ICBM.

The contract award for the first underground Minuteman base, at Malmstrom Air Force Base, Mont., has been indefinitely delayed because of the $25-million spread between the Pentagon's $50-million construction estimate and the lowest of four bids for the work.

The Department of Defense picked Ellsworth AFB, near Rapid City, S. D., as the site for the second Minuteman base. Invitations to bid will be issued in a few months. Ellsworth AFB is also the support center for a nine-launcher Titan squadron under construction.

Missile experts are surveying the area around Pease AFB, Portsmouth, N. H., as a possible location for a third Minuteman base.

"'K&M' ASBESTOS-CEMENT

LAYS AS FAST AS

Assembling 16" "K&M" Asbestos-Cement Pressure Pipe by hand without the aid of a bar. The backhoe merely steadies and aligns the pipe. The easy, two-step operation consists of (1) lubricating the tapered end of the pipe, and (2) sliding pipe into coupling.

PRESSURE PIPE

A SHOVEL DIGS..."

G&B Construction, Inc., Youngstown, Ohio, installs 4½ miles of "K&M" Asbestos-Cement Pressure Pipe for the Austintown District of Mahoning County, Ohio

"You can lay 'K&M' Pipe as fast as a shovel can dig. There is nothing that will hold you back with this pipe. When you can lay a 16" water line, and it goes in as easy as an 8" water line, what more could you ask? They've got a good joint with that FLUID-TITE® Coupling . . . the pipe is wonderful to put together. Of all the 'K&M' Pipe we've laid, we never had a coupling break."

Those are the comments of Louis Gulfo, partner with Mike and James Bertilacci in G&B Construction, Inc. They installed "K&M" Asbestos-Cement Pressure Pipe in bitter cold, during February and March 1960. However, neither rain, snow, nor mud interrupts the installation of this modern pipe. The exclusive, patented "K&M" FLUID-TITE Coupling and the simple fitting procedures required make assembly easy.

Little or no maintenance will face Mahoning County, which built and will operate the system for a year, or the City of Youngstown, Ohio, which will then take it over. Being non-metallic, "K&M" Asbestos-Cement Pressure Pipe won't rot, corrode, or tuberculate, and is immune to electrolysis. The suppliers of this pipe were Trumbull Plumbing Supply Co., Warren and Youngstown, Ohio.

Now, in addition, you may use quality "K&M" Plastic Pressure Pipe in the same system with "K&M" Asbestos-Cement Pipe, if desired.

Write today for more information on "K&M" Asbestos-Cement Pressure Pipe to: Keasbey & Mattison Company, Ambler, Penna. Dept. P-1311.

K·M
BEST IN ASBESTOS

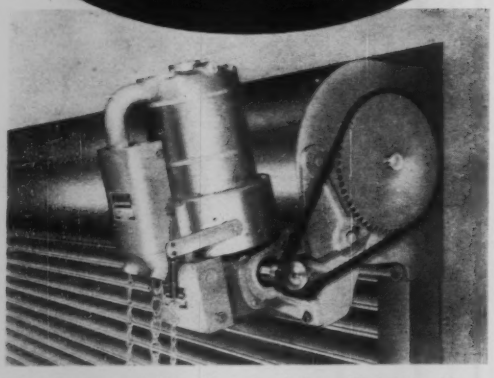
Keasbey & Mattison at Ambler

Left to right: Louis Gulfo, G&B Construction, Inc.; Dale MacCleary, sales manager, Trumbull Plumbing Supply Co.; James Bertilacci, G&B Construction, Inc., Burke Lyden, Asst. Chief Engineer, Youngstown, Water Dept., Jim Bisciglia, Asst. Engineer, Mahoning County, and J. Henry Painter, Trumbull Supply Company.

3 miles of 16" "K&M" Asbestos-Cement Pressure Pipe were installed. Here, we see it ready for installation along Webb Road, in Austintown Township. In branching from the 16" water line, Mahoning County used 1 mile of 12" "K&M" Asbestos-Cement Pressure Pipe and ½ mile of 8" "K&M" Asbestos-Cement Pressure Pipe. Specifications call for 90 lbs. pressure when line is in operation serving 16,000 residents.

Kinnear Has *THE* Door...

and the finest power operator ever devised



Here's compact "bonus power" for efficient rolling-door action! The New Kinnear Motor Operator permits either face-of-wall or wall-bracket mounting — vertically or horizontally — for either adjacent or thru-the-wall door control. **Thermal protection** is built-in; motor cuts out before overload damage can occur. **Centrifugal clutch** starts door action with no shock, no jolt, no stalling! New **worm gearing** extends the life of the operator-unit even beyond previous limits! **Seven sizes** assure capacities for every need. For the best possible push-button door efficiency, combine the Kinnear Motor Operator with . . .

Kinnear *invented* the door with the interlocking steel-slat curtain *more than half a century ago!* And today's Kinnear Rolling Doors still lead in all-around door efficiency!

Opening straight upward they coil smoothly out of the way above the doorway.

They clear the entire opening quickly, from jamb to jamb and from floor to lintel.

They stay out of reach of damage by wind or vehicles.

All floor and wall areas around Kinnear-equipped doorways are always fully usable.

Ceiling space also remains clear, for unimpeded use of overhead cranes, hoists, conveyors, ductwork, or lighting.

The tough, flexible, all-metal Kinnear curtain assures long service, low maintenance costs, extra protection against fire, wind, intrusion, or vandalism.

Heavy galvanizing (1.25 ounces of pure zinc per sq. ft. of metal, ASTM Standards) — plus Kinnear Paint-Bond — adds high resistance to weather, wear, and corrosion.

For push-button or remote-control efficiency, there's no match for the all-new Kinnear Motor Operator (optional, at left).

Kinnear Rolling Doors are built in any size. Get Kinnear recommendations on your door needs. Write the Kinnear Mfg. Co. *(Factories: 1820-40 Fields Ave., Columbus 16, Ohio, and 1742 Yosemite Ave., San Francisco 24, Calif.) Offices and agents in all principal cities.*

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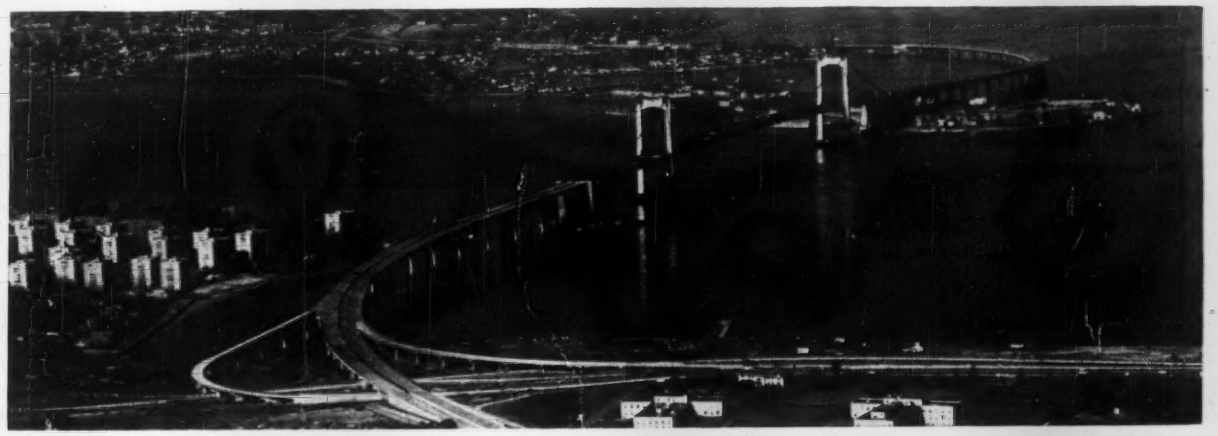


THROGS NECK BRIDGE, a two-mile link between New York City's boroughs of Bronx and Queens over Long Island Sound, opened on schedule this month. Almost 14,000 miles of wire are spun into the bridge's two suspension cables.

New England

• **Massachusetts expressway**—The State Department of Public Works has 57.3 miles of Interstate highways under construction, 77.1 miles under design, 62.6 miles under survey and mapping and 60.3 miles in basic planning. Route 93 from the New Hampshire line to Boston will be completed early in the summer.

• **Taunton River Bridge**—Work on the substructure of the $21.5-million bridge over the Taunton River between Somerset and Fall River, Mass., began last November. Completion of the 1.1-mile, six-lane span for Interstate Route 195 is scheduled for early-1964.

• **Boston vehicular tunnel**—The Massachusetts Turnpike Authority hopes to have the one-mile, $29-million second vehicular tunnel under Boston harbor open to traffic in November, six months ahead of schedule. The new tube parallels the existing Summer Tunnel, which took five years to build.

• **Boston Common underground garage**—Contractors for the Massachusetts Parking Authority have completed excavation of 250,000 tons of earth and are placing concrete for the 3-ft thick foundation of the 1,500-car, $7.5-million parking garage under Boston Common. An opening in late summer is expected.

• **Boston Airport**—The Massachusetts Port Authority launched a $15-million expansion program for Boston Airport that will take several years to complete. Work will include rebuilding of the passenger terminal at a cost of some $6 million.

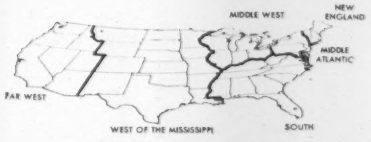
Middle Atlantic

• **New York highways**—The Empire Stateway, running 183 miles from the Pennsylvania line near Binghamton to the Canadian border near Watertown, is 25% finished. The $325-million route has 49 miles under construction. The $301-million Northway, which will extend from the Thruway at Albany to the Canadian border in Clinton County, is 25% finished. Four projects with a total value of $15.4 million were let last year.

The $217-million Long Island Expressway, running from the Queens Midtown Tunnel to Riverhead, is 47% complete. Some $9.5 million worth of contracts was let last year. Two contracts with a total value of $15.4 million were let late last year for work on the $120-million Cross Bronx Expressway.

Three miles of the 6.9-mile, $80.2-million Bruckner Expressway are under construction. The Bronx route, the southern terminus of the New England Thruway, is 10% completed.

• **Pennsylvania highways**—The Penn-Can Highway, which runs from the New York line near Binghamton to the Pennsylvania Turnpike near Scranton is 97% complete. The 41-mile, $33-million project should be open to traffic in December. The Monroeville Bypass, east of Pittsburgh, is 30% complete. The superstructure work and paving on this $11-million, 5.25-mile project will be done this year. The $17-million, 15.25-mile Washington bypass on Interstate Route 70 is 20% completed. Builders will work on structures and paving in 1961. Completion is set for July, 1962.



The regional breakdown

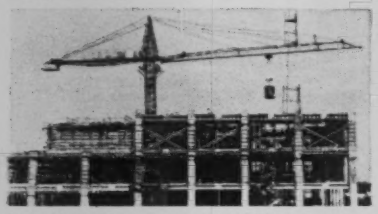
• **Niagara Parkway Project**—Work began late last year on the $12.5-million bridge between Lewiston, N. Y., and Queenston, Ont. The 1,000-ft fixed arch bridge is set for completion in May, 1962. The Niagara Expressway will connect the bridge with the North Grand Island Bridge. Work on this expressway is 15% complete and it is set for completion at the same time as the Lewiston-Queenston Bridge.

• **Verrazano-Narrows Bridge**—The $320-million suspension bridge linking Brooklyn with Staten Island is 10% completed. Tower pier caissons are under construction and anchorage excavation work is begun. During 1961 tower piers will be completed and erection of towers will begin. Contracts will be let for the approach foundations and steelwork. Completion is scheduled for 1965. Owner is the Triborough Bridge and Tunnel Authority of New York.

• **George Washington Bridge**—Work on the addition of a six-lane lower deck was begun and completed last year. The extra deck will increase capacity by 75%. Work this year will be on construction of New Jersey and New York approaches. Owner is Port of New York Authority.

• **Throgs Neck Bridge**—New York's Triborough Bridge and Tunnel Authority opened the $90-million bridge between the Bronx and Queens early this

HOW "CONCRETOR" The Linden Crane CLIMBING-CRANES REVERSE RISING CONSTRUCTION COSTS



Peter Kiewit Sons utilizes "CONCRETOR" CLIMBING-CRANE in effecting important savings of time, labor, money on own office building in Omaha, Nebraska.

The "CONCRETOR" CLIMBING-CRANE goes up with the building while work is in progress... 2-3 floors at a time... the sky's the limit. Climbs by its own hoisting winch on floors or inside elevator shafts.

"CONCRETOR" CLIMBING-CRANES efficiently place loads "on a dime"... up to 100 foot radius due to the 360 degree swing of its 100 foot jib. They eliminate the need for expensive rehandling of materials over unnecessary ramps and runways, substantially lowering operating costs. Recommended for all types of construction including industrial, apartment and office buildings, silos, water towers, bridges and viaducts.

"CONCRETOR" CLIMBING-CRANES cost about half of what you'd expect to pay for earth-bound cranes of similar capacity. With ordinary use, the cost can be amortized over a period of about 2 years.

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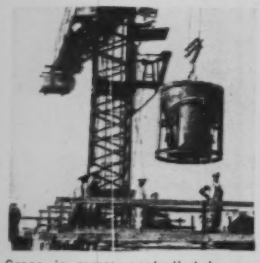

Crane is remote-controlled by one man from working deck with 3½ lb. electronic panel.

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OAKLAND INTERNATIONAL AIRPORT expansion program includes a new section located on a 14-million-cu-yd fill extending two miles into San Francisco Bay.

month. The six-lane bridge has a 1,800-ft center suspension span and 555-ft side spans. Construction began late in 1957.

• **Dulles International Airport**—The $100-million jet airport for Washington D. C. is 50% finished. Three runways are entirely paved. The apron and utilities are 85% complete. Reinforced concrete structure for the terminal is half done. Scheduled opening date for the airport has been changed from mid-1961 to mid-1962.

• **Brooklyn piers**—Under the Port of New York Authority's $90-million pier construction program, five piers along the Brooklyn waterfront are completed and three are under construction. The $5-million Pier 6 will be completed in April, the $7.6-million Pier 7 in June, and $5.2-million Pier 8 in October.

The Department of Marine and Aviation will complete the $9.8-million 39th St. Pier this summer.

• **Pier 40**—New York City's Department of Marine and Aviation will complete its $19-million prestressed concrete Pier 40 on the Hudson River early this year. It will be the largest commercial pier in the city.

• **Elizabeth piers**—Port of New York Authority began construction of $26.2 million worth of marine facilities last year on Newark Bay at Elizabeth, N. J. Work includes five steamship berths, two transit sheds and dredging of a new channel 9,000 ft long and 800 ft wide. Completion is set for 1962.

• **ICBM bases**—The last Atlas base selected, Plattsburgh Air Force Base, Plattsburgh, N. Y., which will house 12 ICBM's in underground silos, is 24% complete. It will be finished in November. Work on the Titan II base at Griffiss AFB, Rome, N. Y., has been delayed until July, because of a funding problem.

• **Potomac River bridges**—Woodrow Wilson Bridge, a $14-million, six-lane, 5,900-ft welded plate girder bridge with a 227-ft bascule span, has reached 85% completion. Opening is expected for September. About 60% of the concrete deck remains to be placed and work will resume on it in March. Contracts will be let early this year for lighting, painting and a 2-in. asphalt roadway surface.

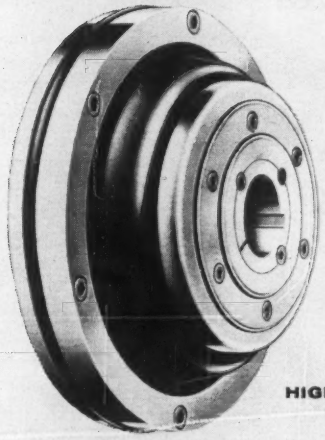
George Mason Bridge, a 2,265-ft continuous welded girder bridge on 14 piers will go into service early next year. This $9.2-million, four-lane bridge replaces an obsolete bridge. The substructure is 90% complete and the superstructure is under way. Owner is District of Columbia.

Theodore Roosevelt Bridge, built by the District of Columbia Department of Highways at a cost of $24.6 million, is scheduled for completion in July, 1963. The six-lane bridge's superstructure is 30% done.

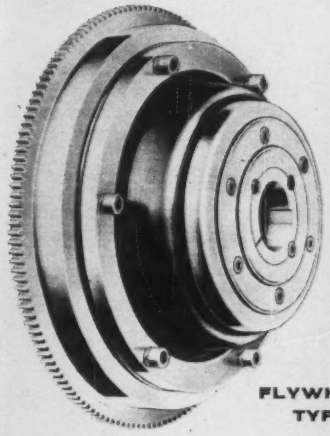
Cabin John Bridge, under construction since last summer, should be open to traffic by September, 1962. It is a 1,400-ft, dual span, steel girder structure. Owner is Maryland State Roads Commission.

• **Capital Beltway**—This is a 65-mile, $200-million outer loop around Washington, D. C. Virginia will open about 8 miles of its 22-mile, $78-million portion this year and expects to complete its entire link between two new Potomac River bridges by late 1963. Part of Maryland's 43-mile, $114-million section, the connection to the Woodrow Wilson Bridge, is being readied for traffic this September.

• **Andrews Air Force Base**—Washington District, Corps of Engineers, plans to finish by August the $40-million construction program at Andrews AFB.



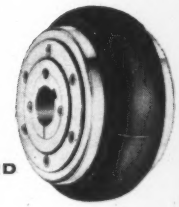
HIGH SPEED TYPE



FLYWHEEL TYPE

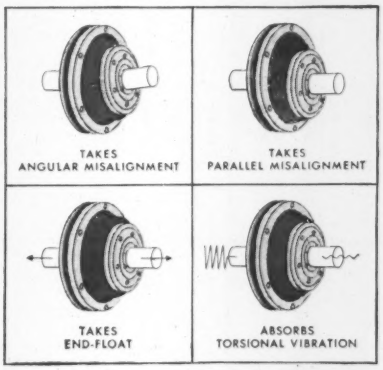
NOW! THE COUPLING WITH THE 4-WAY FLEX

IN TWO NEW TYPES — HIGH SPEED AND FLYWHEEL



STANDARD TYPE

THE 4-WAY FLEX OF PARA-FLEX



DODGE Para-flex

Industry asked for this—and here it is! Dodge Para-flex, the unique coupling that swallows up misalignment, is now available for high speed applications, and for high torque at either high or low speed.

The new Dodge High Speed Para-flex is specially designed for operation with motors and internal combustion engines that turn up to 5230 rpm.

The new Flywheel Para-flex, with the same capabilities, has a flexing element that bolts directly to the flywheel of internal combustion engines.

Like the Standard Type (with capacities up to 2000 hp at 1080 rpm) these new Para-flex Couplings feature a modern, tire-like flexing element that handles angular and parallel misalignment, end-float (or any combination) and absorbs torsional vibration. The amazing performance of Para-flex Couplings is a matter of record in thousands of installations.

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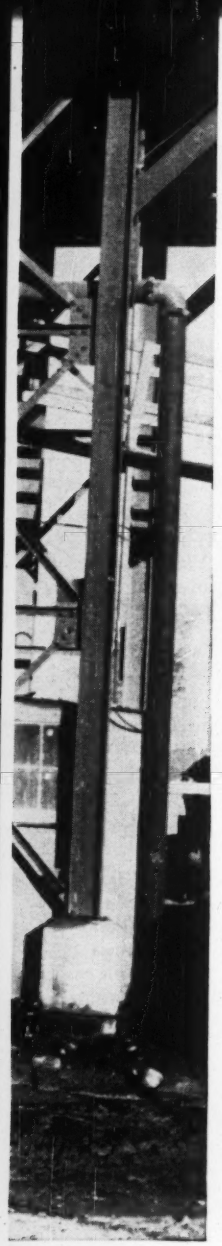
B.F.Goodrich helps unlock Ohio River traffic jam

WITH TIRES, HOSE AND OTHER PRODUCTS, B.F.GOODRICH SPEEDS CONSTRUCTION OF NEW NAVIGATION SYSTEM

Time was when traffic was slowed by 4 separate locks in a 95-mile stretch of the Ohio River. But the Capt. Anthony Meldahl Locks and Dam will flood them. This project is part of a modern navigation system that will reduce 13 locks and dams to 3, and lockage time from 19½ hours to 1½ hours.

Groves Ventures Company of Minneapolis, Minnesota, a joint venture sponsored by S. J. Groves & Sons Co., is on the job with an army of B.F.Goodrich tires and always-available BFG tire service. Rock Service tires, for example, haul 33-ton loads of concrete from batch plant to lock forms over rock-strewn roads. No problem for these BFG giants, though. They're available in new



33 TONS OF CONCRETE leave batch plant (photo at left) bound for lock pouring area (below). Locks will be 110′ x 1200′, will require over 670-thousand cubic yards of concrete, will cost over $25-million. B.F.Goodrich Rock Service and Rock Rib tires haul concrete 16 hours a day, 6 days a week down 2 long grades into the cofferdam excavation. Roads are covered with crushed rock and gravel, and often with 6″ of water. Yet BFG tires give exceptional service, Groves Ventures reports.

B.F.GOODRICH ON-THE-JOB TIRE SERVICE keeps Groves Ventures equipment rolling on lock project near Chilo, Ohio—keeps tire costs at a minimum. The BFG Servicemobile and repair shop are manned by tire experts, whose workmanship prompts Project Manager W. J. Green to write, "B.F.Goodrich service and repair facilities have done an excellent job of covering our needs."

NO STING IN THIS STEAM HOSE, used to cure concrete at Capt. Anthony Meldahl locks. It's Burstproof hose, made of BFG-developed heat-resistant rubber with layers of braided wire reinforcement. It can't explode. Supplying Groves Ventures with hose, belting and protective clothing—as well as tires—is all part of the BFG Unified Contractor Program. Contractors benefit from lower costs and better rubber products' service with this new BFG program.

Cut Protected compound that defies tire-killing rock.

B.F.Goodrich Flex-Rite Nylon cord construction withstands double the impact of ordinary materials, resists heat blowouts and flex breaks. Result: more retreadable tires. No wonder Groves Ventures specifies BFG tires.

You'll find B.F.Goodrich hose, protective clothing and other products at work here—all part of the BFG Unified Contractor Program that helps contractors cut costs and get better service from rubber products. Call your nearby B.F.Goodrich Smileage dealer (listed under Tires in the Yellow Pages). He has the know-how to help make your next contract more profitable. *The B.F.Goodrich Company, Akron 18, Ohio.*

Specify **B.F.Goodrich Tubeless or tube-type tires when ordering new equipment**

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South

• **Palmetto Expressway**—Designed to permit motorists to bypass Miami's heavy traffic, 18.2 miles of this 24.2-mile, $30-million expressway are already in use. Completion is scheduled for mid-1961.

• **Georgia expressways**—Atlanta has a $120-million expressway system under construction. The $65-million North-South segments are now 80% complete. Contracts valued at $8.4 million were let last year for eight miles of construction within the circumferential loop around the city. On the East-West segments, contracts totaling $1.1 million for four bridges were let during 1960. Some 25 miles of East-West expressways running from downtown Atlanta east to Conyers are now under contract.

The state of Georgia let contracts on a total of 267 miles of Interstate Highways and 83 miles of these have been finished. The longest single stretch of Interstate work is a 126-mile portion of Interstate 75 between Houston County and the Florida border. Twenty-one miles of this were completed during 1960, bringing the total miles finished to 58. The state will let $60 million work of Interstate contracts this year.

• **36th Street Tollway**—This expressway between Miami International Airport and downtown Miami is 15% complete. It will be finished early in 1962 at a total cost of $5.7 million.

• **Chesapeake Bay Bridge-Tunnel**—Driving of construction piles for this 17½-mile, $200-million bridge-tunnel link between the Delmarva Peninsula and Norfolk, Va., will begin in March. Completion is set for late 1963.

• **Pensacola Bay Bridge**—The 15,640-ft, $8.4-million bridge over Pensacola Bay at U. S. Highway 98 was completed late in 1960. The four-lane bridge has a precast, prestressed concrete superstructure.

• **Biloxi Bay Bridge**—Work on the main span and approaches is under way and the project is 20% completed. The Mississippi State Highway Department will let contracts for access roads this year. The $7-million job is slated for completion by February, 1962.

• **New River Tunnel**—The $6.5-million, four-lane vehicular tunnel under the New River at Fort Lauderdale, Fla., was completed in December, 1960, after more than two years of work.

• **Mississippi River Gulf Outlet**—This short cut from New Orleans to the Gulf of Mexico, 70 miles long as compared with 110 miles via the Mississippi River, will be ready for ships by 1963. Last year builders dredged out along the existing Intracoastal Waterway and into the new channel.

GRACEFUL INTERCHANGE emerges from work on the Akron Expressway.

• **Port of Miami**—Dredging and construction work on a $20-million port on one of the Dodge Islands in Biscayne Bay began last fall. The Metropolitan-Dade County Commission expects to have a usable port by 1962.

Middle West

• **Ohio expressways**—Among major highway projects completed in Ohio last year were a 35-mile, $35.5-million stretch of Interstate Route 75 between Cincinnati and Dayton; a 38-mile, $29.9-million section of Interstate Route 71 from Columbus to the northeast, and a 22-mile stretch of Interstate 71 west of Akron from SR 302 to U. S. Route 224.

Highway jobs that got under way in 1960 included a $19.7-million, 17-mile section of Interstate 90 from northeast of Cleveland to a point south of Painesville; 21 miles of four- and six-lane divided pavement on State Route 20 from Cleveland to Painesville at a cost of $32 million, and 8 miles of State Route 46 south from Ashtabula on a $10-million contract.

The Department of Highways will let contracts this year on the $17.9-million Fort Hayes Interchange in Columbus; a 1.36-mile, $9.8-million section of the Millcreek Expressway in Cincinnati, and $7-million, 1.56-mile stretch of the Willow Freeway Extension in Cleveland.

• **Chicago expressways**—The 19-mile, $237-million Northwest Expressway from the Loop to O'Hare Airport and the 16-mile, $180-million Congress Expressway from Michigan Ave. to the Illinois Tollway system were opened to traffic in 1960.

The Cook County Highway Department awarded 44 contracts totaling

(*Continued p. 120*)

New Joy TDM-B1 swing boom trac-drill has complete power positioning and automatic hose reel

The new Joy TDM-B1 Trac-Drill with swing boom features full range power positioning of the drill. In swinging to any drilling angle from vertical to horizontal, there are no manual adjustments. The exclusive new hose reel trains air hose in all drilling positions, eliminating fouling—saving frayed hose and tempers.

Another exclusive feature, a new control arm swings the drilling controls with the boom. It puts the operator up front, where visibility for spotting is best, and then can be moved to any desired position—operation is independent of the boom.

The TDM-B1 carries Joy's dependable 450-DR Dual Rotation Drill. This drill provides hammer-free rotation for fast steel changes, plus a strong assist to normal rifle-bar rotation when needed.

The Joy TDM carrier is the most versatile machine in its class, and now offers you the option of either the new Swing Boom model, or the universal U-Bar machine. For complete information on the Joy TDM Trac-Drill, see your Joy distributor or write for Bulletin 2671-24.

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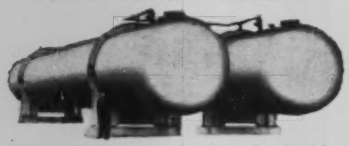

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$33 million and completed 35 contracts costing $32 million last year. The county will award about $45 million worth of expressway contracts in 1961. This includes $22 million on the east and west legs of the South Route, $13.5 million on the Southwest Expressway and $5 million on Stony Island Expressway.

The Chicago Department of Public Works will award all remaining contracts on the city's portion of the South Route, some $34.5 million worth of work, this year.

• **Duluth-Superior Bridge**—This $15-million bridge over St. Louis Bay, between Duluth, Minn., and Superior, Wisc., is two-thirds finished and will be completed by the end of 1961. Both abutments and all 51 of the reinforced concrete piers in the 7,975-ft long bridge are completed.

Bridge components completed are: the three truss spans containing a 600-ft tied arch and two 270-ft anchor spans; nine steel beams spans, and 30 structural steel deck girder spans.

The Wisconsin and Minnesota State Highway Departments will award contracts early this year for the four-lane bridge deck, the bridge lighting and the Superior approaches.

• **Sault Ste. Marie Bridge**—Eight contracts totaling $10.3 million were awarded last year for work on the substructure and superstructure of the international bridge over St. Mary's River between Sault Ste. Marie, Mich. and Sault Ste. Marie, Ont. The substructure of the 9,280-ft bridge was 20% complete when winter halted work. The bridge will be opened to traffic in September, 1962.

• **Chicago bridges**—Contracts totaling $3 million were awarded last year for reconstruction and new construction of bridges, including work on a 10-block long viaduct. One bascule bridge was completed over the South Branch of the Chicago River, and three movable bridges altered for one-man operation at a total cost of $6.3 million.

About $6.2 million of bridge contracts will be awarded this year. They include construction on a bascule bridge, a high-level fixed bridge, a major viaduct and converting two movable bridges to one-man operation.

• **Ohio River bridges**—Construction of the $10.7-million Louisville-New Albany bridge will be completed this year. The double-deck structure, carrying three lanes of traffic on each deck, is made up of two 800-ft tied arch spans and one three-span 450-ft continuous truss.

SOUTHWEST BOULEVARD connects Kansas City, Mo., downtown with suburbs.

Work on the $31.3-million Louisville-Jeffersonville bridge will get under way early this year. Completion is slated for mid-1963. The single-deck, six-lane structure will be a multiple cantilever with spans of 300, 700, 500, 700 and 300 ft.

• **Chicago's O'Hare Airport**—Ten contracts totaling $19 million were completed last year, advancing the $130 million expansion program to 35% completed. Contracts totaling $75 million were awarded last year for new hangars, terminal and concourse buildings, cargo facilities, grading and paving, water mains, sanitary sewers and other utilities.

Additional contracts totaling $35 million will be awarded this year, to complete the first stage of the development program by January 1962.

• **Navy Pier extension**—Chicago's Navy Pier will have 1,200 ft of new pier facilities ready for the shipping season this spring. Improvements will include 1,200 ft of docks and sheds costing $2.8 million.

West of Mississippi

• **Texas expressways**—The $12.3-million, 11¼-mile section of Interstate Loop 610 in Houston is about 30% complete. An $801,000 contract for three grade separations and two bridges will be let this month. Interstate Highway 35 in San Antonio, a 6.1-mile, $7.5-million stretch is 55% complete and the job will be finished in September. A $1-million contract will be let in the spring

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There is imagination and precision thinking built into the remarkable Geodimeter.

An all purpose, highly accurate surveying instrument that has become the criterion against which measuring unknown distances by other means are compared.

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There are three Geodimeter instruments available to answer every possible requirement:

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- Geodimeter Model 3 for medium range distances up to 20 miles and accurate to 0.3/ft.
- Geodimeter Model 4 for short range everyday general use, especially for engineers and surveyors. Measures accurately up to 5 miles to 0.04/ft.

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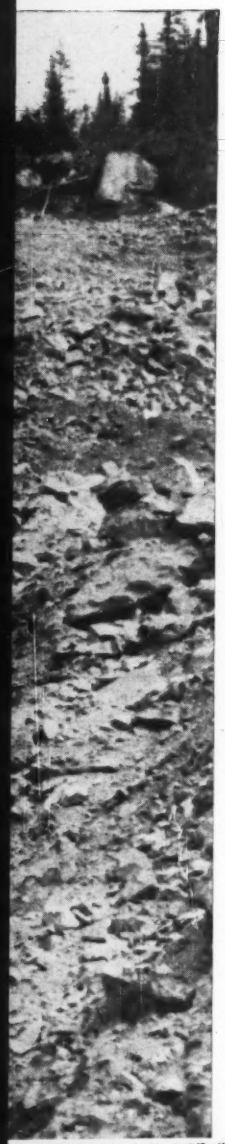


Reliable job-proved performance, backed by competent and well stocked dealer parts and service facilities, makes "Euc" Rear-Dumps your best bet for top production at lowest over-all cost.

There are lots of ways to compare hauling equipment but no matter what method you use there's only one real measure — reliable performance on the job.

For over 25 years Euclid Rear-Dumps have been the outstanding choice of contractors, mines, quarries and industrial users of off-highway haulers. More than half of the orders for new "Eucs" are from previous owners — repeat business that is the best evidence of customer satisfaction with the product and the service available from Euclid dealers.

With this unequalled field experience and continuous product improvement, "Eucs" give you operating advantages that cut downtime and provide greater work-ability. An experienced dealer organization with complete parts stocks and service facilities is further assurance that your "Eucs" can always be kept in top shape wherever they may be working.

You can depend on "Eucs" and your Euclid dealer for bonus benefits that don't show in the specs but are mighty important in making Euclids your best investment.

EUCLID Division of General Motors, Cleveland 17, Ohio

Plants at Cleveland and Hudson, Ohio and Lanarkshire, Scotland

Euclid pioneered many of the rear-dump features that are "standard" today . . . free floating springs, planetary type final drive, exhaust heated bodies, Torqmatic Drive with torque converter and semi-automatic transmission, double acting hoist and other engineering advances that cut hauling costs.

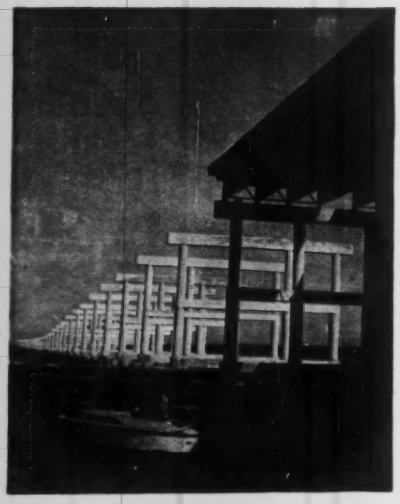
for the $5-million Interstate Highway 35E in Dallas. Completion of this project is scheduled for autumn. A 7.3-mile section of Interstate Highway 45, including the Galveston Bay Causeway and approaches, is in the early stages of construction. Some $7.5 million in work will be let this year for 5.3 miles of highway. The causeway is 58% complete. Three contracts worth a total of $9.5 million will be let for work on Interstate Highway 10 in Jefferson County.

• **Missouri expressways**—The Mark Twain Expressway, a 23-mile route between St. Charles and downtown St. Louis, is 92% complete. The $55-million job will be finished in July. The $20-million Interstate Route 70 in Kansas City, between Independence Ave. and Route 40, is 60% finished and will be completed in mid-1962. The $20-million section of Interstate 70 from east of Columbia to southwest of Booneville was finished last October, including a 3,018-ft bridge over the Missouri River. A 28-mile stretch of Interstate Route 44 between Route 50 interchange and the proposed Route I-244 interchange, now 65% done, is expected to be completed in 1964. Thirty-one miles of Interstate Route 29, between St. Joseph and the Platte River is 98% complete. The $17.6-million highway will be opened to traffic in July.

• **Port Lavaca Causeway**—Contractors for the Texas State Highway Department have completed 76% of construction of the causeway over Port Lavaca in southeast Texas, the substructure and part of the superstructure. A $2.8-million contract for approaches will be let this year. The $7-million project is a precast, prestressed concrete span.

• **ICBM bases**—Construction was completed last year on the nine-launcher Atlas base at Offutt Air Force Base, Omaha, and two nine-launcher squadron installations were finished at Warren AFB, Cheyenne. A third at Cheyenne is 95% completed. Work is 97% done at Forbes AFB, Topeka. Several bases with 12 Atlas launchers are scheduled for completion in the last half of the year, Schilling AFB, Salina, Kan.; Lincoln AFB, Lincoln, Neb.; Walker AFB, Roswell, N. M.; Dyess AFB, Abilene, Tex., and Altus AFB, Altus, Okla.

Installations for the first nine-launcher squadron for Titan I at Lowry AFB, Denver, is 96% complete and the second is 95% done. The Titan I base at Ellsworth AFB, Rapid City, S. D. is 78% in place and will be finished in December. Construction has just begun for two Titan II bases, McConnell AFB, Wichita, and Little Rock AFB, Little Rock. Both are set for completion in early 1963.



PRECAST, PRESTRESSED concrete supports Texas' Port Lavaca Causeway.

Construction of the first Minuteman base, the 150-launcher installation at Malmstrom AFB, Great Falls, Mont., is delayed because of the broad (55%) spread between the low bid and the $50 million the Corps of Engineers estimated for the job.

• **Love Field**—Construction work on the $9-million expansion program for Love Field, Dallas, Tex., will begin early this year. Main project is an 8,000-ft parallel runway.

Far West

• **California highways**—The California Division of Highways will award about $100 million in contracts each quarter during 1961.

The $20-million Southern Freeway in San Francisco and San Mateo Counties is 20% completed and scheduled for an opening in late 1963 or early 1964. Bids will be called for a 1.3-mile, $6-million section this year and, possibly, for a 1.8-mile, $4.6-million stretch.

The Bayshore Freeway between San Francisco and San Jose is 90% finished and should be completed in November. The 52.9-mile route costs $58.7 million.

The 84.3-mile Redwood Freeway (U.S. 101) from San Francisco north is 80% complete. No sections are budgeted for bid invitation this year.

Three contracts with a total length of 8.2 miles and total value of $21.7 million will be let this year on the MacArthur Freeway (U.S. 50) in Oakland, for which no definite completion date has been set.

The final link on U. S. 40 between the San Francisco-Oakland Bay Bridge and the Carquinez Bridge was finished last August. Total cost was $62.1 million. Late last year an eight-mile section in Pacer County was opened as part of a project to bring the 120-mile stretch of Highway 40 between Sacramento and the Navada line to freeway status.

• **Oregon highways**—Last year saw completion of 40% of the 310-mile Interstate 5 and 28% of the 376 miles of Interstate 80N.

The Oregon Coast Highway (U.S. 101) Gold Beach to Brookings project is 80% finished. Work to be contracted this year will complete this section, except for a 3-mile stretch.

The $10.5-million final link in the Baldock Freeway between Portland and Salem is 85% complete and work will be finished this year.

• **Hawaiian expressways**—The $15.5-million Kalihi Valley Highway was completed in December after almost six years of construction. The highway connects Honolulu with Windward Oahu.

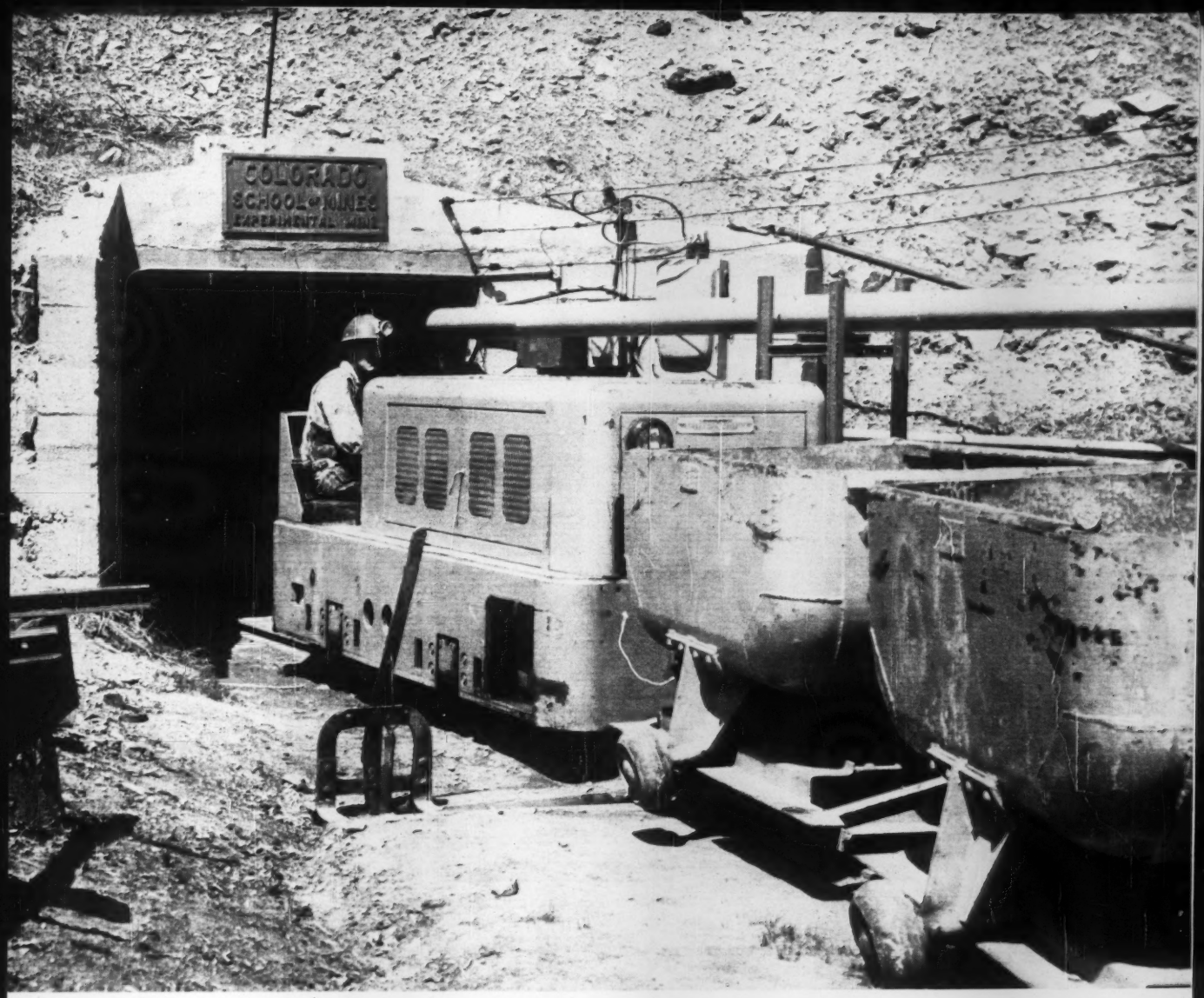
Hawaii will let contracts this year for projects on outlying islands, a $2-million bridge and highway job on Kauai; a $2.5-million, 9-mile extension of the Island of Hawaii belt road, and a $2.5-million replacement of lower Kula Road on Maui.

• **Tacoma - Seattle - Everett Freeway**—Opening of a 3-mile, $8-million section of this $230-million freeway brought completed mileage to 5 miles. Total length will be 55 miles when this route is completed in 1966. Fifteen miles are under contract and 10 miles will be placed under contract in 1961.

• **Hood Canal Bridge**—Although 75% complete, work on the Washington State Toll Bridge Authority's floating bridge has been almost at a standstill since storms damaged several pontoons last winter. The 23 pontoons will be strengthened and anchored in place this year. Completion of the $17-million, 6,500-ft bridge is scheduled for July.

• **Lake Washington floating bridge**—Work is expected to begin this year on 31 reinforced concrete pontoons that make up a 1.4-mile floating bridge between Seattle and the east shore of Lake Washington. Washington State Toll Bridge Authority will invite bids on $6 million worth of approach work. Completion of the $25-million span is expected in mid-1963.

• **Benicia-Martinez Bridge**—At the end of 1960, the substructure was 54%



PLYMOUTH MINE-O-MOTIVE

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Plymouth is the choice at the Colorado School of Mines, world renowned for leadership in the teaching of Mining Engineering. A 5 ton Plymouth Diesel, with Plymouth Exhaust Conditioner, is used in the Experimental Mine, 8,800 feet up in the Rocky Mountains at Idaho Springs, Colorado. This mine is both a showplace and testing ground for the newest, most modern mining equipment. The student roster reads like a directory of the United Nations, with countries such as Brazil, Chile, Venezuela, Canada, and as far away as Burma, being represented. Each student is trained in the operation of the Plymouth Mine-O-Motive along with the other mining equipment. Mine Instructor Maynard Ayler reports excellent service from the Plymouth (which is approved under Schedule #24 of the U.S. Bureau of Mines) with no noticeable contamination of the air in the mine.

Plymouth is proud to be represented at the Colorado School of Mines. Plymouth Mine-O-Motives are built in sizes from 3½ to 50 tons, for service in any mine or tunneling operation. Let Plymouth Engineers solve your haulage problems and reduce your costs. Purchase plans are available. Contact Plymouth Locomotive Works, Division of The Fate-Root-Heath Company, Dept. A-4, Plymouth, Ohio.

Plymouth Exhaust Conditioners are available for other types of Diesel-powered, underground equipment. Engineering and testing services for special applications are also offered.

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Only glass containing wire mesh qualifies as a fire retardant and enjoys recognition in most state and municipal codes as a safety factor in glazing openings in windows, skylights, partitions, exit doors and other vital areas in buildings.

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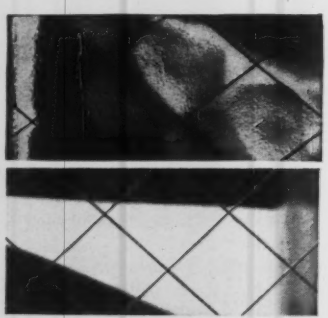

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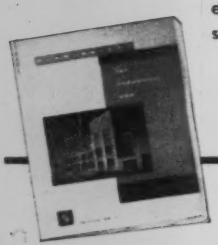

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. . . Transportation Projects

complete and the superstructure 10% complete on this $20-million bridge. Completion is set for next year.

• **Webster St. Tube**—This $17.5-million two-lane vehicular tube between Oakland and Alemeda, Calif., will be completed late next year.

• **San Francisco International Airport**—The City and County of San Francisco will spend or commit $14.8 million this year for improvement and expansion of this airport. The $32-million project is 33% completed.

• **Oakland International Airport**—The $20-million expansion and improvement work on Oakland's international airport is 45% done. Completion is scheduled for March, 1962. Port of Oakland will award contracts for paving main runway, taxiways and aprons and for field lighting this year.

• **Los Angeles Harbor**—Port of Los Angeles Harbor Development completed a special container terminal and a marine grain terminal last year as part of a five-year development program. Contracts to be let in 1961 will be for a passenger-cargo terminal and improvement and expansion of wharf facilities.

• **Marina del Ray Harbor**—Los Angeles County will let contracts for an administration building and development of 64 parcels of land in this $30-million marina in 1961.

• **Puget Sound Naval Shipyard**—The world's largest drydock, located at Bremerton, Wash., is 60% complete. Floating caisson-type gates will be installed and walls constructed this year. Completion of the 1,152-ft long drydock is set for March, 1962.

• **Alberta-California natural gas pipeline**—This 36-in., 1,404-mile pipeline will carry 415 million cu ft of natural gas per day from Alberta to California. Total cost is $300 million. Completion is expected by early 1962.

• **ICBM bases**—A launch complex for three Atlas ICBM's was completed in 1961 at Vandenberg Air Force Base, Santa Maria, Calif. The Titan I base at Beale AFB, Marysville, Calif., got under way last year and the $45-million job is 46% finished. Completion for the underground base is set for April, 1962. A similar base at Larson AFB, Moses Lake, Wash., is 64% finished and scheduled for completion early next year. The 18-launcher Titan II base at Davis-Monthan AFB, Tucson, Ariz., has just been started and won't be finished until early 1963.

PAIRED for Speed and Savings!

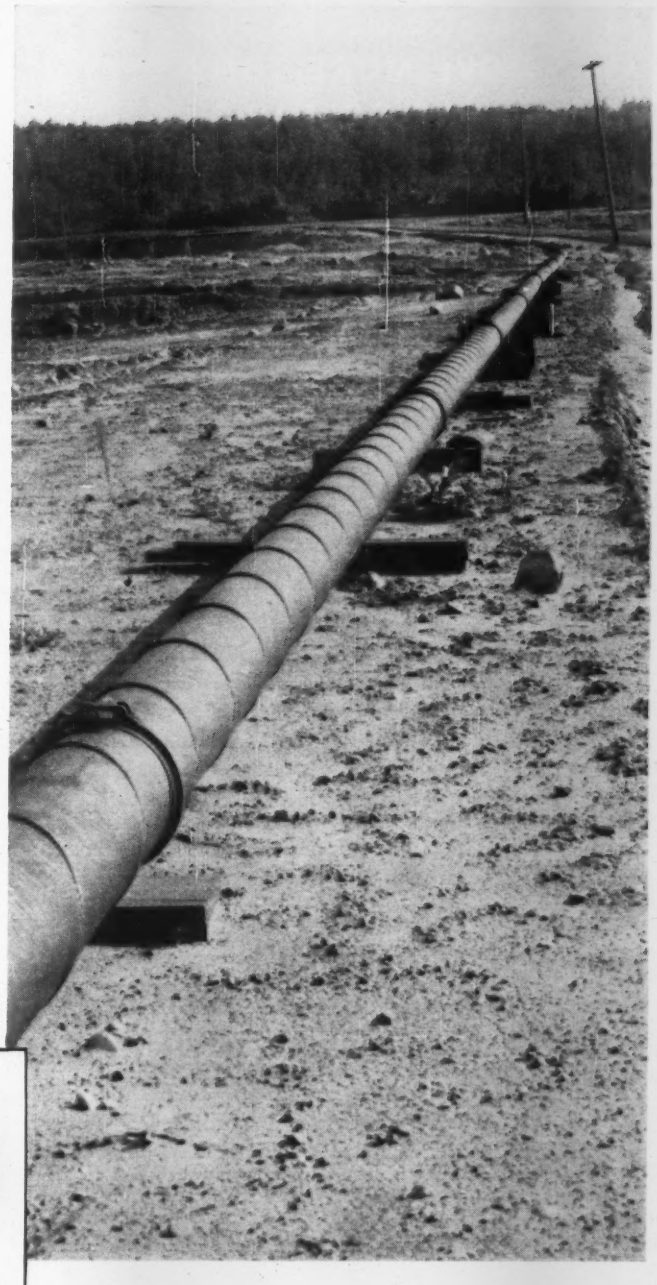
For pipe lines in construction service, you'll like the way NAYLOR Spiralweld pipe and Wedgelock couplings work together to save time, work and money.

Because NAYLOR pipe is light in weight, it is easier to handle and install. Moreover, the distinctive lockseamed-spiralwelded structure provides the strength and safety your job requires.

Likewise, Wedgelock couplings save time in making connections. The work is simplified since a hammer is the only tool required to connect or disconnect them.

Whatever the service—air, water, or ventilating . . . doesn't it make sense to look into this hard-working combination for your operations?

Write for Bulletin No. 59 to get the details.



The NAYLOR Wedgelock coupling makes a positive connection, securely anchored in standard weight grooved ends.

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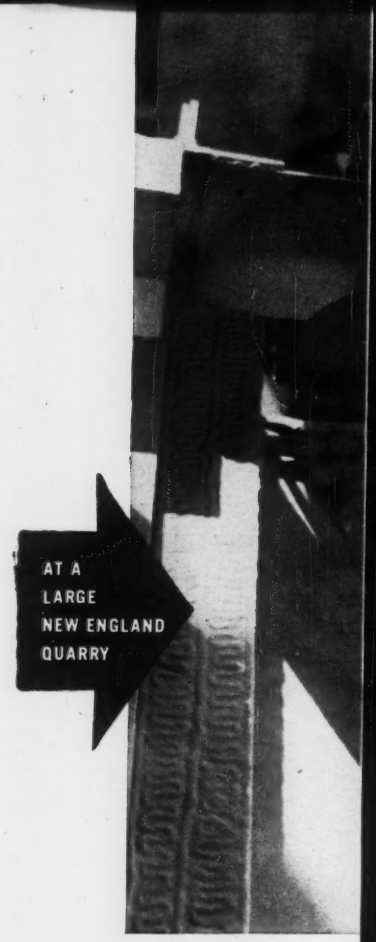
More proof that...

AMSCO HELPS YOU MOVE MORE TONS PER DOLLAR

How AMSCO screen parts and Simplex 2-Part Dipper Teeth are giving users greatly improved service life*



AT A LARGE NEW ENGLAND QUARRY

AMSCO CHUTE PLATES LAST 5 YEARS VS. 4 WEEKS FOR PREVIOUS TYPE

In the screen house of this quarry, two Amsco HC-250 abrasion-resistant chute plates are used on each Hi-G discharge screen. 500 tons per hour pass over each plate, during the two-shift, 20-hour operating day.

This installation resulted from a previous test, in which a set of Amsco plates was compared with regular carbon steel plates. The Amsco Chute Plates *lasted about 5 years*, whereas the competitive plates had to be replaced every 4 weeks.

The quarry operator reports that the Amsco plates presently installed are holding up excellently in service. Their exceptionally long life and trouble-free service means big dollar savings—through elimination of costly shutdown time.

ON THE NIAGARA POWER PROJECT

AMSCO SIMPLEX 2-PART TEETH DIG 40,000 YARDS OF ROCK BEFORE REPLACEMENT

At the right, you see the type of rugged rock excavation in which this outstanding service record was set. It's part of the Niagara Power Project—Conduit #2 South—being handled by Gull & Defelice Construction Company.

All dippers on the job are equipped with Amsco Simplex 2-Part Reversible Teeth. They operate 16 hours a day, 6 days a week—*handle approximately 40,000 yards of rock*—before tooth replacement is required.

In addition to their exceptionally long wear, the fact that Simplex Teeth *can be replaced in ten minutes with no trouble* is an important advantage to the operators. It all adds up to big savings—in replacement cost and shovel downtime.

*Patent No. 2,904,908

Wherever high impact and abrasion are problems, you'll "move more tons per dollar" with Amsco Dippers, Dipper Teeth and Crusher Parts. See your equipment dealer, or write us direct for technical bulletins.

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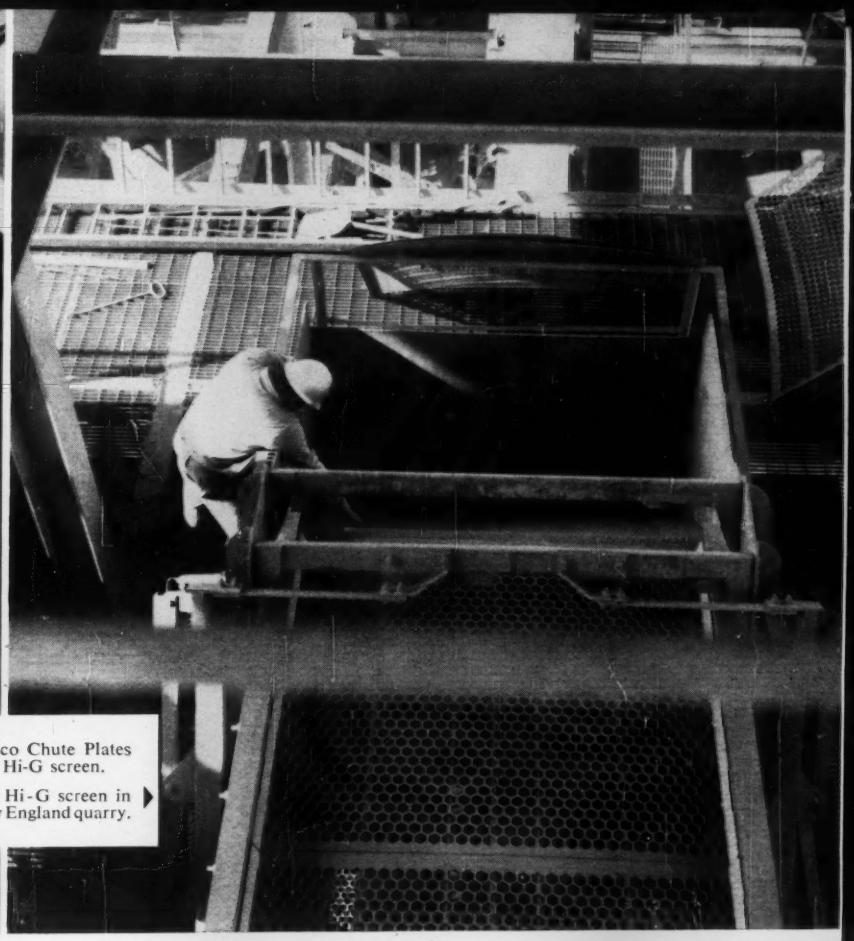
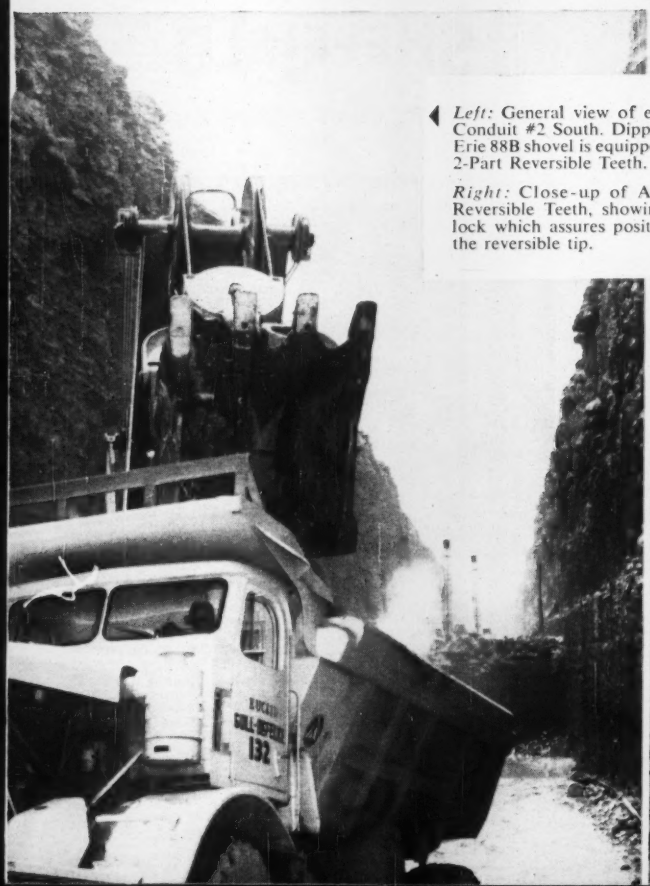
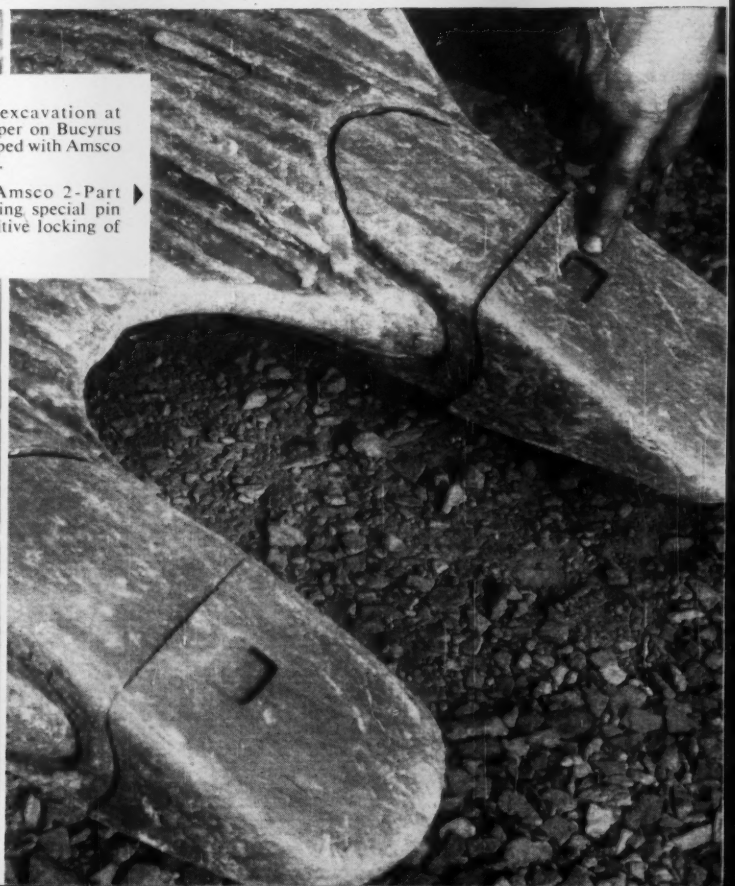


Left: Close-up of Amsco Chute Plates used on each discharge Hi-G screen.

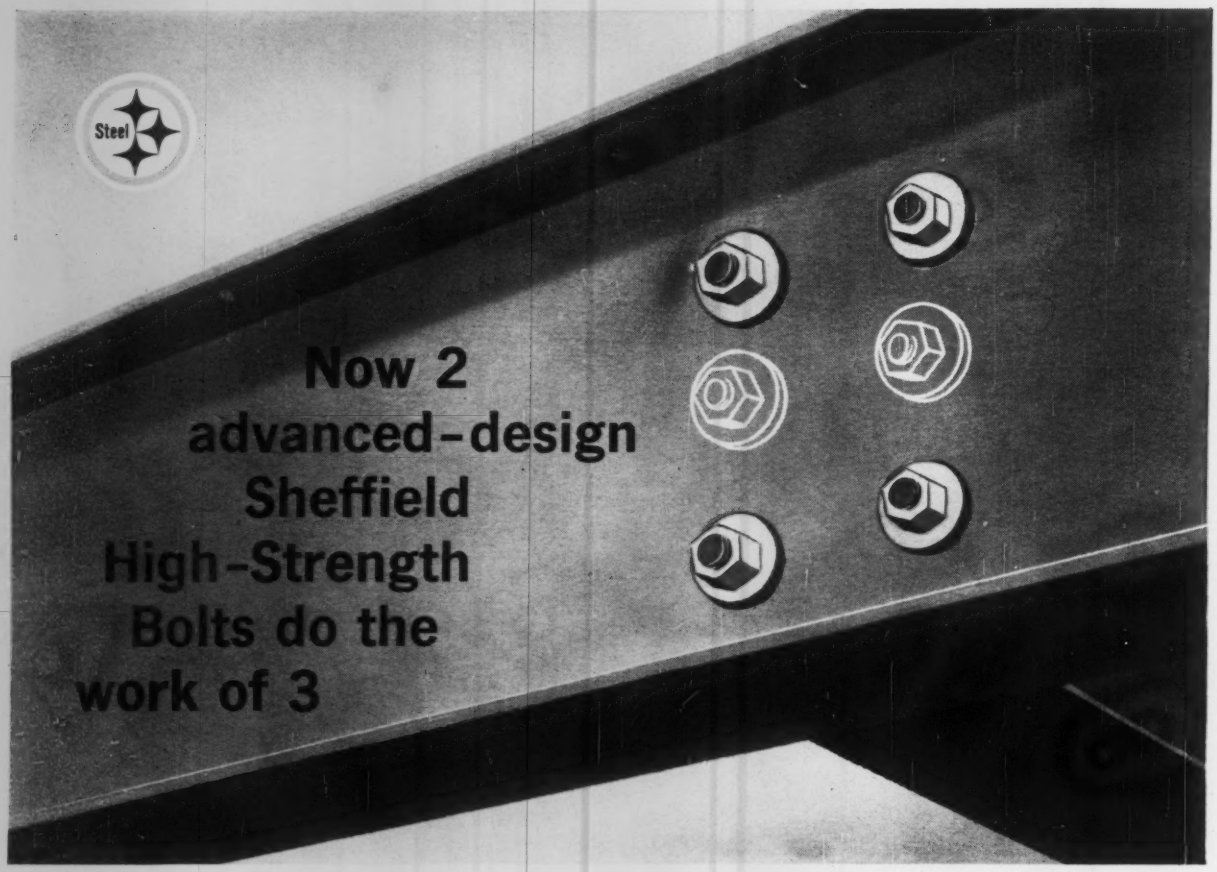
Right: General view of Hi-G screen in screen house of large New England quarry.





Left: General view of excavation at Conduit #2 South. Dipper on Bucyrus Erie 88B shovel is equipped with Amsco 2-Part Reversible Teeth.

Right: Close-up of Amsco 2-Part Reversible Teeth, showing special pin lock which assures positive locking of the reversible tip.



The advantages of high-strength bolting over riveting are greater than ever with this newly designed Sheffield bolt. Fastening time and material costs are greatly reduced. You can save up to 40% in bearing connections.

Three Sheffield High-Strength Bolts have always had the shear strength of three rivets of the same size. Now two of these new Sheffield bolts do the work formerly requiring three bolts.

Why? Because the new, shorter thread length increases shear strength because threads have been removed from the shear plane of the joint. Heavy head design eliminates one of the two washers formerly required.

More than ever, high-strength bolts give the strongest, lowest-cost fastening for structural joints. Sheffield High-Strength Bolts are tested, and approved by the AISC and Research Council on Riveted and Bolted Structural Joints. Backed by Sheffield's quality control and reputation for the best bolts since 1888. Get the whole story from your nearby Sheffield sales office.

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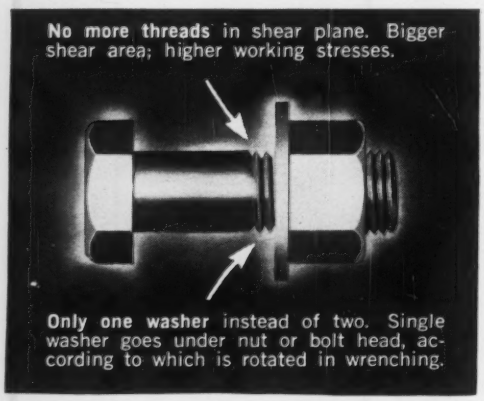
SHEFFIELD

High Strength Structural Bolts


No more threads in shear plane. Bigger shear area; higher working stresses.
Only one washer instead of two. Single washer goes under nut or bolt head, according to which is rotated in wrenching.

ARMCO Sheffield Division

Materials Prices

Monthly Market Quotations By ENR Field Reporters

STRUCTURAL CLAY BUILDING TILE, BRICK AND LIME—DELIVERED

	STRUCTURAL CLAY TILE PARTITION — SCORED Per M. lots of 2,000 pieces or over, 3x12x12 In.	4x12x12 In.	8x12x12 In.	STRUCTURAL CLAY TILE — LOAD BEARING — SCORED Per M. lots of 2,000 pieces or over, 8x12x12 In.	10x12x12 In.	12x12x12 In.	BRICK Per M. In quantity Common backing	Straight hard	LIME Per ton, In paper, Carload lot, Hydrated finishing	Common hydrated	Pulverized
Atlanta	$186.10pe	$154.95pkke	$309.90pe	$348.65pe	.....	.....	$33.25uu	$33.25uu	$36.50hh	$28.50hh	$28.50hh
Baltimore	217.00	231.00	434.00	491.00	602.00	690.00	36.00	41.00	35.80	23.40	.....
Birmingham	135.00pss	152.00pss	.....	303.00p	376.00p	465.00p	27.00ff	38.00jj	38.25mm	20.87mm	26.33gmm
Boston	232.00†mm	248.00†mm	463.25†mm	556.00†mm	.....	.....	43.50p	58.00p	42.00§	34.00§	.....
Chicago	137.00ll	149.00ll	280.00ll	.....	.....	.....	32.00	34.00	1.00llaa	.90llaa	.....
Cincinnati	179.00mmyrr	190.00jmmrr	355.00jddmm	390.00jmmrr	422.00jmmrr	500.00jmmrr	48.00jk	47.00jk	29.10jmm	29.10jmm	29.10jmm
Cleveland	205.00tt	219.00tt	.....	465.00tt	.....	709.00tt	43.25tt	47.25ggtt	32.75ptt	28.00ptt	.....
Dallas	162.00	162.00	318.75	387.00	472.50	585.00	30.00	51.00	43.58	25.32	28.00
Denver	170.00	185.00	310.00	310.00	390.00	442.00	35.00zz	54.00	50.00p	44.00p	46.00p
Detroit	257.00mm	274.00mm	514.00mm	582.00mm	767.00mm	876.00mm	53.50pmm	54.00pmm	38.00mm	30.00mm	40.00mm
Kansas City	158.00	158.00	312.00	312.00	400.00	500.00	34.00	34.00	36.26	34.26	29.76
Los Angeles	r	r	r	r	r	r	42.00uu	.....	38.00mnll	38.00mnll	39.00mnll
Minneapolis	208.00pe	225.00pe	452.00pe	225.00pwe	.....	.....	49.50ype	58.00ype	50.00bbe	40.00bbe	52.00bbde
Montreal	168.78Ruqoo	180.93auqoo	325.00auqoo	220.00qoo	400.00qoo	.....	48.25bll	56.30bll	39.00	22.00	13.25
New Orleans	178.00	178.00s	371.25	371.25	.....	.....	42.00	55.00	48.00p	40.00p	.....
New York	185.00h	197.00h	294.00ch	297.00hn	.....	.....	46.00p	.....	50.00p	44.00p	.....
Philadelphia	208.40ss	222.30ss	416.90sszz	517.30ss	.....	.....	40.00mm	45.00mm	40.00mmp	24.50	27.50
Pittsburgh	200.00t	213.00t	400.00t	453.00t	607.00t	693.00t	42.00t	40.00t	30.00t	26.00t	34.00t
St. Louis	180.00mmpp	190.00pp	380.00pp	410.00ppp	440.00pp	621.50pp	44.00mmpp	45.50pp	1.00aapp	.80aapp	1.35zaapp
San Francisco	156.85*mm	177.10*mm	235.30dd*mm	159.40qqmm	.....	.....	43.00*mm	43.00*mm	29.24mm	29.24mm	31.74mm
Seattle	235.00pt	270.00pt	490.00pt	265.00pwt	.....	.....	57.00t	71.00t	52.00bbt	38.00bbt	4.50mbbt
Toronto	169.00rr	185.50rr	360.00rr	281.50frr	405.00rr	.....	25.00rr	65.00rr	42.00mm	38.00mm	36.50mm

•§ F.o.b. yard. •• F.o.b. plant Stockton. •† F.o.b. yard Roxbury. •a Smooth. •b $4.50 del. •c 8 x 12 x 12 In.-8 cell. •d Pulverized hot. •e less 5% disc., 10th. •f 8 x 8 x 12. •g Lumps, $26.72. •h F.o.b. trucks, job site N.Y.C. •i 60 lb sacks. •j Truck load or over. •k $1.00 discount per M, 10 days. •l Red face. •m Per bb. 180 lb. processed. •n 7¾ x 7¾ x 12. •o Mason's double hydrated pressure. •p Truck lots. •q Provincial and Municipal tax extra (6%). •r Not used: earthquake danger. •s 8 x 16 x 12. •t less 2% disc., cash. •u Incl. Federal tax. •v Sand lime. •w 5 x 8 x 12. •x dumped. •y Chi common. •z Pebble: 80 lb sack. •aa 50 lb sack. •bb LCL. •dd 6 x 12 x 12. •ff 80% common. •gg Smooth. •hh less 25¢ disc., cash. •ii F.o.b. plant. •jj rough: smooth: $40. •kk 3½ x 11½ x 11½. •ll less 2% disc. 10th. •mm less 2%, 10 days. •nn F.o.b., L. A. •oo less 2%, 30 days. •pp add 2% sales tax. •qq 8 x 5½ x 11½. •rr 2½% disc., 10 days. •ss 5% disc., 10 days. •tt less 2% disc., 15th. •uu less 50¢/M, 10 days •vv 4000 pcs. and over. •R revised.

PAINT, ROOFING—F. O. B. CARLOAD LOTS

	RED LEAD Per 100 lb. In 600 lb. (Approx.) bbl. F.O.B. Plant Dry a C	WHITE LEAD Per 100 lb. In 100 lb. cases In oil	READY-MIXED PAINT Per gal., drums Graphite b	Aluminum c	Ferric Oxide d	ROOFING SUPPLIES: Carload lots f.o.b. factory Rolls, slate surfaced, 85–90 lb. per sq.	Asphalt felt, per 100 lb.	Tar felt, per 100 lb.	Asphalt coating per gal.	Tar pitch 380 lb. bbl. per ton
Atlanta	$14.25ggJO	$24.00ggJ	$3.59	$3.90	$3.31	$2.90kk	$2.20kk	$2.85kk	$0.67kk	$65.35kk
Baltimore	17.50fpp	24.00	3.00	4.40	3.50	3.06	3.67	4.04	.50	54.00
Birmingham	26.00†J	29.00†J	3.90J	3.40J	....	2.95†mm	2.17iitmm	3.17iitmm	.76ffmm	48.00eemm
Boston	24.95†oomm	26.90†mmm	....	....	....	3.55q	2.60g	2.79g	.55g	60.00g
Chicago	15.25rJqqpp	24.00†J	....	....	....	3.45ukk	2.50okk	3.00okk	48.00bkk	57.70†kk
Cincinnati	15.25†JO	24.00†J	....	....	....	2.74mm	1.88omm	2.42omm	.56ymm	55.96Hmm
Cleveland	25.65†	26.90†	2.61ggP	2.69zzqq	3.46qqq	2.85q	2.10o	2.55o	.41y	49.00gg
Dallas	22.50	23.50M	....	3.25B	....	3.00u	3.00o	3.00o	.470	66.00kk
Denver	23.85n	24.00	3.70	5.10	3.70	2.71	1.93o	2.80o	.50ff	50.00
Detroit	15.75r	24.00rr	2.70mm	3.95mm	2.70mm	2.82mm	2.05ommll	2.42mmll	.58ffmm	49.00mm
Kansas City	26.90lqqoo	25.65	3.99	3.43	3.01	3.00mm	2.50omm	2.50omm	.55y	....
Los Angeles	16.25yy	22.00	3.30n	4.50n	4.20n	3.40nkk	2.40nikk	I	.75nykk	....
Minneapolis	17.25N	21.50kk	....	....	....	2.85kk	2.10hikk	2.55hikk	.52ikk	50.00rkk
Montreal	19.45O	26.00wtt	5.52Dff	6.55zff	5.10kff	5.40	4.65f	4.65f	1.60	4.40uu
New Orleans	23.00Jpp	24.00J	....	....	....	2.78	1.98	2.85	.680	45.50
New York	14.75ooO	29.75	....	....	....	2.99zz	2.20zzo	2.65o	.52z	49.00*
Philadelphia	14.750mm	19.00mm	3.35mm	3.90mm	3.65mm	4.70	3.60	2.36	.74	49.00
Pittsburgh	21.50mggJ	24.00J	2.20EJ	2.25FJ	2.25GJ	2.90uH	2.15uH	2.15H	.56H	55.00H
St. Louis K	25.65†m	26.90	....	....	....	2.95ttmm	2.19hhK	2.64hhK	.44yK	55.33K
San Francisco	26.70mm	26.90mm	3.20mm	4.30mm	3.50mm	2.87mm	1.72aatimm	2.59mm	.46jf	54.00
Seattle	13.35HO	24.00H	....	4.19ccfJ	....	3.70qccH	3.06hccH	....	.59cc	....
Toronto	13.95	20.85	5.15J	6.18J	5.95J	3.50	2.75aae	2.75o	.70†	57.00A

•† Delivered. • Note: Red lead in oil 50% higher than white lead in oil. •• Aver. wt. approx. 425 to 550 lb drums. •a Red lead prices change frequently due to pig lead price changes. •b U.S. War Dept. Spec. 3-49A. •c ASTM Spec. D266-31. •d 80% minimum ferric oxide. •e Per 108 sf roll. •f Per 432 sq ft. •g F.o.b. yard Roxbury. •h Per roll, 65 lb. •i Net carload prices, Minneapolis and vicinity. •j 45 gal containers. •k Over 80% ferric oxide. •l Not used. •m 100 lb. keg. •n F.o.b. city. •o Per 60 lb roll. •p 6-drum, 50 gal each. •q Per 90-lb roll. •r F.o.b. factory, Chicago. •s Truckload. •t Incl. Federal tax. •u Per 90-lb square. •v Per ton. •x Ready-mixed. •y 55-gal container. •z Drums. •aa 15 lb. •bb Roofers coating and cement. •cc LCL, truck delivery. •ee Asphalt pitch in 100 lb package •ff 5-ga drums. •gg F.o.b. factory. •hh Incl. freight. •ii Per 324 sf roll. •jj Asbesto[s] roof coating. •kk less 2% disc., 10th. •mm less 2% disc., 10 days. •oo 100 lb bbls. •pp 50 or 100 lb bags. •qq 500 lbs or more •rr F.o.b. plant, Detroit. •ss 50 lb bbls. •tt 25 lb kegs. •uu 250 lb bbls. •xx Sept.: Rolls revised to $2.75, Asph. Felt revised to 1.71. •yy Sept. revised to $12.00. • zz Sept. revised to $2.80. •A 400 lb barrels. •B ASTM Spec. D962-49. •C 95%. •D Std. black. •# Milt. spec.: E TTP27; F TTY81; G TTP31. •H less 2% disc., cash. •I Per 100 lb. •J less 1% disc., 10 days. •K add 2% sales tax. •L CL. •M 1 ton or more. •N under 500 lbs, add $1. •O 50 lb. bag.

PLASTER, VERMICULITE AND METAL BUILDING SHEETS & TUBING

	PLASTER‡ Neat per ton	PLASTER‡ Gauging per ton	VERMICULITE‡ Home Insulation pellets	VERMICULITE‡ Plaster aggregate	VERMICULITE‡ Concrete Aggregate treated	PERLITE‡ Plaster Aggregate	PERLITE‡ Concrete Aggregate Untreated	ALUMINUM SHEET† Flat .100" th 36"x108" & 48"x144" per lbjt	ALUMINUM SHEET† Corr roof .032" th 35"x12' per shu	STAINLESS STEEL† SHEET-TYPE 302g 20 ga 48"x96"–120' per cwthh	STAINLESS STEEL† SHEET-TYPE 302g 28 ga 36"x120' per cwtmm	COPPER WATER* TUBING-TYPE L 2000 ft lots per ft ½"b	COPPER WATER* TUBING-TYPE L 2000 ft lots per ft ½"c
			per bag of 4 cu ft										
Atlanta	$30.00ss	$45.00ss	$1.65ss	$1.65ss	$1.85ss	$1.65ss	$1.65ss	$0.469noo	$27.61nY	$65.44nzz	$72.69nzz	$0.1510ss	$0.1700ss
Baltimore	24.00	35.70	0.95	1.15	1.15	1.15	1.55	0.462	0.451r	63.00	71.25	0.1600	0.2300
Birmingham	37.00ss	43.00ss	1.55ss	1.55ss	1.60ss	1.27ss	1.27ss	0.459M	9.35K	64.50K	73.00K	0.2000ss	0.2700ss
Boston	25.00	30.00	1.40	1.40	1.40	1.55ss	1.55ss	0.474	25.07pAA	64.42dd*zz	72.67dd	0.1500ss	0.1700ss
Chicago	1.45bbtt	1.45bbtt	1.55	1.60	1.60	1.60	1.60	0.564z	33.43p	64.15ee	72.40ee	0.1510	0.1700
Cincinnati	23.85*ss	23.85*	1.75*ss	1.75*ss	1.85*ss	1.85ss	1.90ss	0.514	9.21	61.00zz	71.25zz	0.1723ss	0.2398ss
Cleveland	29.00N	45.00N	1.14ss	1.16ss	1.24ss	1.45ss	1.45ss	0.459aa	25.07p	63.33oozz	71.58oozz	0.1580	0.2211
Dallas	34.50	34.50	1.05	1.21	1.37	1.21	1.32	0.469	0.484r	64.09	72.34	0.1668	0.1986
Denver	27.00	27.00	1.50	1.40	1.50l	1.50ss	1.60ss	0.475	10.89	65.32qq	73.57qq	0.1670	0.2345
Detroit	28.00ss	28.00ss	1.27ss	1.31ss	1.40ss	1.45kll	1.50kll	0.475a	10.35a	63.00azz*	71.25azz*	0.1588	0.2210
Kansas City	30.00	35.00	1.19E	1.21E	1.29E	1.21	....	0.463	24.66ggvvp	67.50E	76.25E	0.1310	0.1500
Los Angeles	28.00tt	29.00tt	1.25ktt	1.20ktt	1.45tt	1.16	1.26	0.459	8.77Z	65.02	73.27	0.1330	0.2345
Minneapolis	35.00F	35.00F	1.65tt	1.80F	1.95Fl	1.40S	1.50S	0.485	16.23	63.61GR	69.61ffG	0.1710	0.1930
Montreal	22.60h	35.60h	1.25h	1.40h	1.60h	1.15v	1.15v	43.95AH	12.10H	95.75H	....	0.2089BB	0.2450BB
New Orleans	34.00	48.00	1.32P	1.23P	1.40P	1.15P	1.15P	0.469	33.43	63.00Y	72.00Y	0.2058	0.2887
New York	29.00	35.00	1.30	1.35	1.45l	1.35	1.40	0.489aT	0.2507aXAA	64.08a	73.33a	0.1489	0.1545
Philadelphia	26.25	33.00ss	1.40ss	1.25ss	1.45ss	1.05qqss	1.05qqss	0.479	10.98	63.71	71.96	0.1510	0.1700
Pittsburgh	30.00nn	31.00nn	1.25nn	1.30nn	1.40mm	1.40nn	1.40nn	0.475	10.39	63.00	74.50pp	0.1600	0.1800
St. Louis uu	30.00uu	42.00uu	1.50uu	1.60uu	1.65uu	1.50uu	1.60uuY	0.479	9.18	63.39Kmmqq	71.64yuuqq	0.1510fmss	0.1700fmss
San Francisco	29.50ss	30.50ss	1.38ss	1.38ss	1.50ss	1.38ooss	1.58ooss	0.575	10.83	65.00K	77.25K	0.1723	0.2418
Seattle	42.40nn	45.60nn	1.55nn	1.35knn	1.85nn	1.50k	....	0.50D	10.75D	54.02D	73.27D	0.1510	0.1700
Toronto	.82	1.31	1.55	1.50	1.85	1.20Q	....	0.437	26.00ap	73.74	86.52	0.3063	0.3418

‡trucklots, delivered †fob warehouse *fob city •a delivered •b ½" O.D. •c ⅜" O.D. •d per sf •e 34" x 60" sheet •f per 100 ft •g 5 tons & up: cold roll, anneal & pickled 2B finish •h incl. Federal tax •i add 25¢ for pint of additive •j 1100 & 3003 alloy, mill finish •k bag of 3 cu ft •l not treated with air entraining agent •m 2-10MH ft •n fob mill fr equalized with nearest stocking competitor •o 250 sacks or more •p 100 sq ft •r per lb •s 30 lb bag •t 38" x 108";–10.81 lb/sh; 48" x 144"; 21.7 lb/sh •u 19.31 lb/sh •v fob plant •w 48" x 144" •x 0.11"th •y 27 gauge •aa 16M lb & up •bb Per 50 lb bag •dd add $1.00 cwt boxing •ee 4 tons & up •gg add $2 cwt boxing; $0.75/cwt on skids •hh Theoretical wt for 48" x 96": 60.4-lb. per sh •ii 300-bag lots •jj 100-lb bag •mm Theoretical wt; 19.7-lb per sh •nn 2% cash •oo skid packed •pp type 304 •qq Philadelphia and suburbs. •rr less 2% disc. 15 days. •ss less 2% disc. 10 days. •tt less 2% disc. 10th. •uu add 2% sales tax. •vv Type N. •xx less ½% disc. 10 days. •yy .021 ga. •zz .061" th. •A Per 100 lb. •C 15M lb. •D less ½% for cash. E Quantity differential. •F less 5% disc. 10th. •G less ½% disc. 10th. •H Fed. tax exempt. •K less ½%, 10 days. •L 5% disc. 30 days. •M 3003: .452 for 1100. •N less 2%, 15th mo. O less $2, cash & carry. •P less 2%, 15 days. •Q per ton. •R revised •S add .10 bag under 200 bags. •T 5000# quantity on 4000# skids. •U 30 Msf quantity; $0.245 in 10 Msf quantity. •X per sq ft. •Y Per sheet. •Z 6,000 lb or over. •AA 30,000 sf or over. •BB Type K

Bids Asked—Low Bidders—Contracts Awarded—

NEW ENGLAND

HEAVY CONSTRUCTION—BA

▲ **CONNECTICUT**—BA 2/6—State Hy. Comr., 170 Douglas St., Hartford, ROADS, **Southington**—7,767 lin. ft. grading, drainage and reinf. conc. pvmt. on section of Interstate Rte. 84, and constr. of 4 bridges, 918 lin. ft. grading, drainage and reinf. conc. pvmt. on connector from Rte. 10 to Interstate Rte. 84 and constr. of 2 bridges, Fed. Aid Projs. I-84-2(23)141 and U-UG-40(4), $2,200,000. Plans deposit $71.75. Steinman, Boynton, Gronquist & London, 117 Liberty St., New York, N. Y., engrs., CD 2/24.

Mass., **Holyoke**—BA 2/13—Bd. P. Wks., City Hall, Whiting Farms ROAD. $240,000. Plans deposit $10. Tighe & Bond, Inc., Bowers & Pequot Sts., Holyoke, Mass., engr.

BUILDINGS—BA

▲ Mass., **North Adams**—BA 2/2—Northern Berkshire Regional School Dist., Dist. dirs. Trade School, East Main St., REGIONAL VOCATIONAL HIGH SCHOOL. Extended Date. $1,400,000. The Architects Collaborative, 63 Brattle St., Boston, Mass., archts. Archie Wright, Main St., North Adams, Mass., engr. CD 12/8.

HEAVY CONSTRUCTION—LB & CA

▲ **VERMONT**—Dpt. Hys., State Office Bldg., Montpelier, bids opened Jan. 13, ROADS, Vt.—**Caledonia Sand & Gravel Co. Inc.**, Box 138, St. Johnsbury, Vt., and **Miller Constr. Co.**, Ascutney Blvd., Windsor, Vt., LB **$1,170,143**, est. $1,250,000, (11 bidders). highway and bridge work, Rte. 103, Proj. F-025-1(8), Chester, (Gassetts). CD 12/22.

BUILDINGS—LB & CA

▲ **E. J. Pinney Co. Inc.**, 220 Dwight St., Springfield, Mass., CA **$1,844,200** HIGH SCHOOL, Chapin St., Veterans Park Site, LUDLOW, MASS. Town, High School Bldg. Comm., Ludlow, Mass. Bids Jan. 4. Awarded Jan. 11. CD 1/10 under LB.

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HEAVY CONSTRUCTION—BA

† **N. J., Wrightstown**—BA 2/8—U. S. Eng., 2635 Abbottsford Ave., P.O. Box 8629, Phila., Pa., OPERATIONAL FACILITIES, maintenance facilities and utilities, McGuire Air Force Base, ENG-30-075-61-100, $200,000. Plans deposit $5. CD 9/28/59.

BUILDINGS—BA

† **Md., Indian Head**—BA 2/7—Area P. Wks. Office, Chesapeake, U. S. Naval Weapons Plant, Wash., D. C., CLEANING HOUSES and modification Bldg. 730, Naval Propellant Plant NBy 32405. $100,000-$250,000.

▲ **N. Y., New York**—BA 2/14—New York City Housing Auth., Rm. 312, 299 Broadway, New York 7, Proj. NY 5-48B, (1) fdns. and general contract, (2) heating and ventilating; (3) electric work (4) plumbing for E. Roberts Moore HOUSES, E. 149 St., Jackson Ave., E. 147 St., Trinity Ave. and St. Mary's Park, Bronx Boro. $7,990,000. Plans deposit $75; furnishing and installation elevators for E. Roberts Moore Houses (Proj. NY 5-48B). Plans deposit $25. CD 3/3/59.

▲† **N. Y., Niagara Falls**—BA 2/14—U. S. Eng., 111 E. 16 St., New York 3, addnl. BOMARC FACILITIES (FY 1961) Niagara Falls Air Force Base, ENG-30-075-61-80. $2,000,000. CD 12/21.

HEAVY CONSTRUCTION—LB & CA

▲ **Brookfield Constr. Co., Inc.**, 521 Fifth Ave., New York, N. Y., CA **$2,041,938**, four dual-lane RAMPS, lower level of George Washington Bridge south of bridge between Haven Ave., Riverside Dr. and 175 St. in New York City, Contr. GWB-190.009, NEW YORK and NEW JERSEY. Port of New York Auth., Rm. 1100, 111 Eighth Ave., New York 11, N. Y. CD 12/28, under LB.

▲ **Gull Contracting Co., Inc.**, 33-15 Lawrence St., Flushing, N. Y., CA **$3,593,000**, Contr. LGA-310.007, Runway 13-31, TAXIWAYS, terminal apron and pump stations, LaGuardia Airport, JACKSON HEIGHTS, N. Y. Port of New York Auth., Rm. 11000, 111 Eighth Ave., New York 11, N. Y. Bids Dec. 27. CD 11/17.

▲ **Reader-Green Constr. Corp.**, 311 Meacham Ave., Elmont, N. Y., CA **$1,632,384**, JUNIOR HIGH SCHOOL addn., alterations, DEER PARK, N. Y. Deer Park Union Free School Dist. No. 7, 1861 Deer Park Ave., Deer Park, N. Y. Bids Dec. 19. CD 11/7.

▲ **Millard D. Shroder, Inc.**, 411 Lexington Ave., New York 17, N. Y., CA Est. **$4,000,000**, 21 story APARTMENT, southwest corner E. 84 St. and 3 Ave., NEW YORK, N. Y. Robert Faber, c/o Faber Realty Co., 1476 Walton Ave., New York 52, N. Y. Schuman & Lichtenstein, 360 Lexington Ave., New York 17, N. Y., archts.

BUILDINGS—LB & CA

▲ **Til Sac Corp.**, 30 Verbena Ave., Floral Park, L. I., N. Y., CA Est. **$1,500,000**, 2 story, bsmnt., 75,000 sq. ft., 125 x 200 ft., brick and precast concrete DEPARTMENT STORE, HUNTINGTON, N. Y. All-State Properties, Inc., 30 Verbena Ave., Floral Park, L. I., N. Y. Copeland, Novak & Israel, 744 Lexington Ave., New York 22, N. Y., archts. A. H. Salkourtz, 87-25 Homelawn St., Jamaica 32, N. Y., assoc. archt. Martin's of Brooklyn, lessee.

▲ **Kreisler-Borg Constr. Co.**, 4 Cromwell Pl., White Plains, N. Y., CA Est. **$1,000,000**, 2 story, 28,000 sq. ft., 80-bed NURSING CENTER, Kossuth Pl. to Steuben Ave. at E. 210 St., Bronx Boro, NEW YORK, N. Y. Montefiore Hospital, E. 210 St. and Bainbridge Ave., New York 67, N. Y. Schuman & Lichtenstein, 360 Lexington Ave., New York 17, N. Y., archts. Stanley Kalfus, 234 W. 56 St., New York 19, N. Y., mech. engr. Greenhut & Taffel, 114 E. 32 St., New York 16, N. Y., structural engrs. Gustave Weiser, 111 Broadway, New York 6, N. Y., elec. engr.

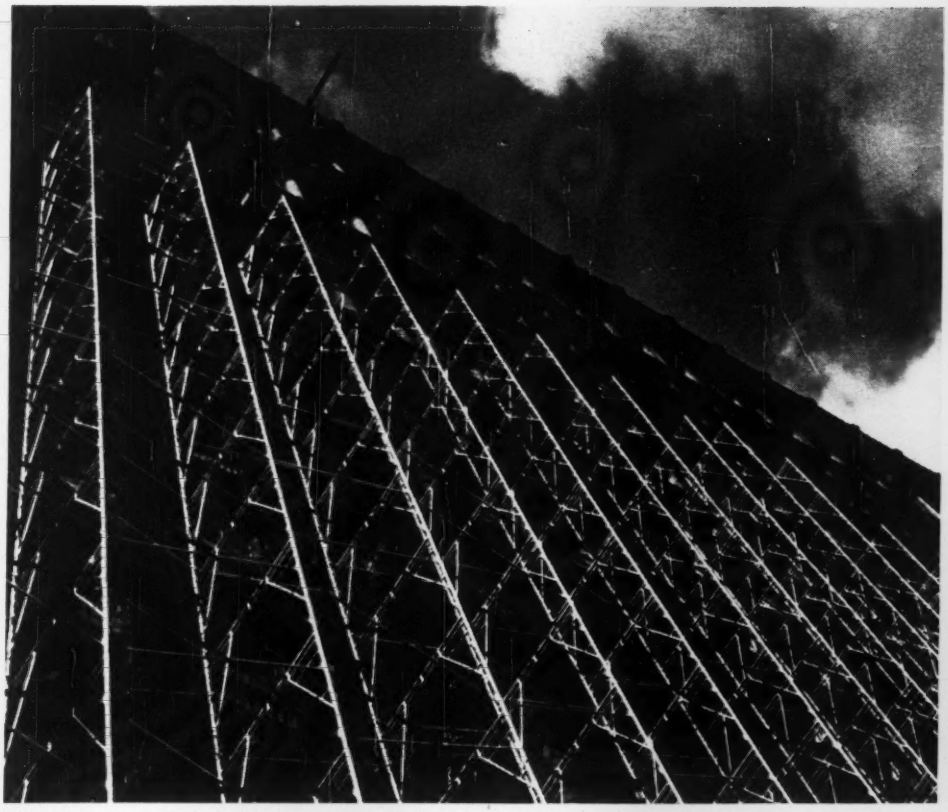
▲ **Websco Constr. Corp.**, 104 So. Central Ave., Valley Stream, N. Y., LB **$1,428,000**, (9 bidders), PHYSICAL EDUCATION, Bldg. No. 11, State University College of Education, PLATTSBURGH, N. Y. State Dpt. P. Wks., State Office Bldg., Albany, N. Y. Bids Jan. 11. CD 12/9.

▲ **Taylor International, Inc.**, 420 Lexington Ave., New York, N. Y., Owner Builds, **$4,000,000-$5,000,000**, 2 APARTMENTS adjoining Gregory Park, JERSEY CITY, N. J. John H. Graham, 2000 K St. N.W., Wash., D. C., archt. CD 7/12.

▲ **Matthews Constr. Co.**, 296 Alex St., Princeton, N. J. CA Est. **$1,200,000**, chemical RESEARCH LABORATORY addn., PRINCETON, N. J. Radio Corp. of America, Pennsy Neck, N. J. CD 1/10.

▲ **John Tester**, Clinton, Md., LB **$2,246,160**, (9 bidders), 1 story steel frame SCHOOL, Quarterfield Rd. and Thelma Ave. near Glen Burnie, ANNAPOLIS, MD Anne Arundel Co. Bd. Educ., Annapolis, Md. Bids Jan. 11. CD 12/28.

▲† **Arthur Venneri Co.**, 1960 K Hy. N.W., Wash., D. C., CA **$5,823,000**, Federal Deposit Insurance Corp., BLAD., 1703 New York Ave. N.W., WASH., D. C. General Services Admin., 7th & D St. S.W., Wash., D. C. Chatelain, Gauger & Nolan, 1632 K St. N.W., Wash., D. C., and Perkins & Will, 309 W. Jackson, Chicago, Ill., archts. CD 12/19/60, under LB.



2100 frames of modern "Trouble Saver"® Sectional Steel Scaffolding make *efficient* working platforms on an 18-story demolition job, by Lippsett, Inc., in New York City. At right, only 32 PS Co. Sidewalk Canopy Frames provide *safe* pedestrian protection during overhead renovation, by Banta Brooks, contractor, on American Bank building, Lansing, Michigan.

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Engineering help is available through 24 branch offices. At each of these locations, warehouses stock the many types of scaffolding used when recommending the correct method for large or complicated jobs, or for small or routine jobs where *the method* is also important.

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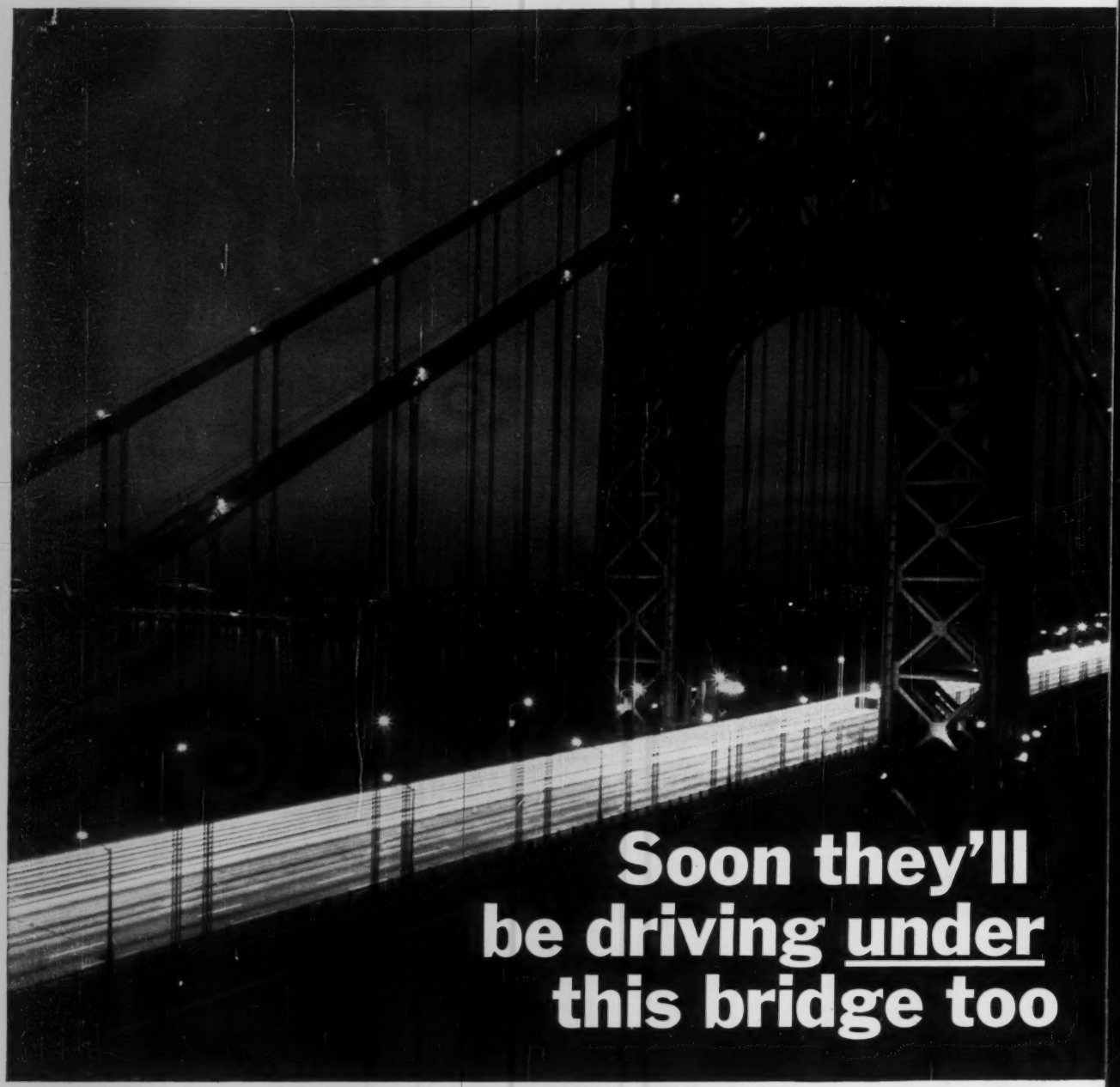


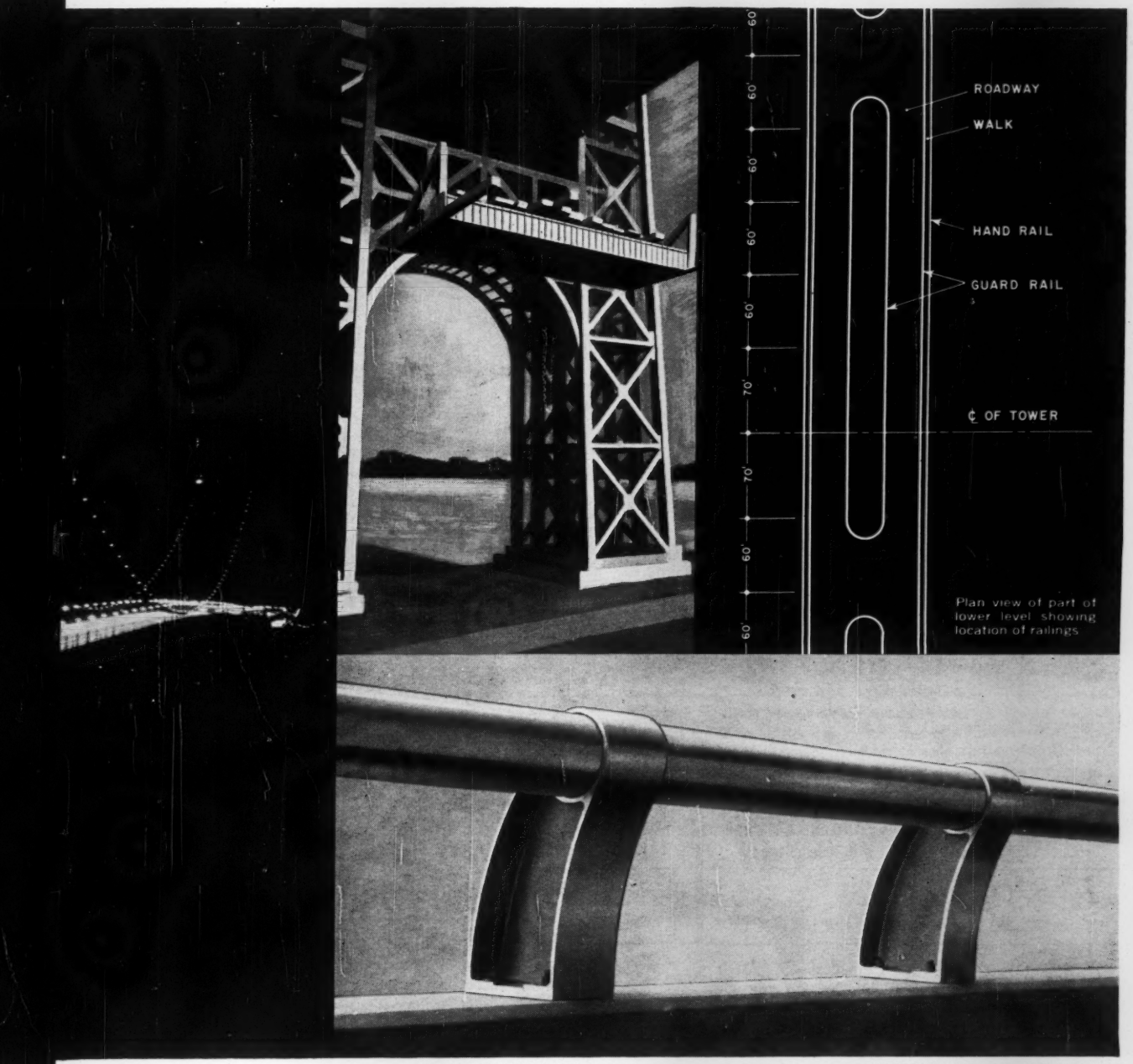
Soon they'll be driving under this bridge too

The George Washington Bridge carried more than 38 million people between New York and New Jersey in 1959.

By 1962 The Port of New York Authority will complete a six-lane lower level to the George Washington Bridge. This new deck, suspended 15 feet below the existing roadway, will increase the bridge's annual capacity by 75%.

For this mammoth, $183 million project, which includes new construction on both the New York and New Jersey approaches, LUPTON bridge railing was chosen. On completion the new roadway will be lined with a LUPTON three rail design on its outer edges. The single rail pictured (above right) will be installed as a guard rail mounted on continuous steel bulkheads on both sides of each three-lane roadway.

LUPTON is fully stocked with standard bridge rail as well as post castings . . . a good variety of attractive and economical designs. And LUPTON has the facilities to produce custom castings. In either case, you can depend on LUPTON to follow your specifications exactly . . . to deliver to the job site on time, in the quantities wanted.



Above, left: Prefabricated steel section being raised into place.

One of two types of LUPTON bridge railing to be installed on the George Washington Bridge's new lower level.

Installation of lightweight LUPTON aluminum bridge railing is simple. Two men, with wrenches as their main tools, can do the job. No overmanned crews, no lift trucks, no cranes. And LUPTON bridge railing is so tough and durable it almost never needs replacement . . . never rusts or needs painting.

Write today for more information on LUPTON bridge railing. Find out about LUPTON RAILIGHT* —the new bridge railing with built-in General Electric Luminaires. (*Trade-mark)

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A Guide to OP and VP

Gurley Optical Plummet

The Optical Plummet Transit opens new avenues in accuracy, speed and convenience...eliminates inconvenience and lost time involved in centering a plummet over a point.

The Optical Plummet is a telescope through the vertical center (spindle) of a transit. It will point vertically when the transit plate is level. The telescope is turned at right angles by a prism, so that vision is actually horizontal. Setting and adjustment may be checked very simply and precisely by rotating the instrument 180 degrees.

The Gurley Shifting Head Tripod permits 1¾" movement of the transit in two directions 90° separated, without material disturbance to the level of the plate (the Optical Plummet thus remains operative through the entire centering procedure).

Advantages of the Gurley Optical Plummet Transit

- Saving in set-up time, as much as 33%—a factor when a crew is waiting.
- Eliminates swaying plumb bob.
- More accurate centering over point.
- On construction work—sights on points some distance below, such as encountered in bridge work and building construction.
- Made in U.S.A.—Little servicing, but easily repaired when necessary.

Gurley Optical Plummet Transits Available in 21 Combinations

With Circular Compass	With Trough Compass	Without Compass
OP-52	—	OP-57
OP-62	—	OP-67
OP-132	OP TC 137	OP-137

And with limb reading to 1 min.; or 30 sec., or 20 sec. . . . Stiff-leg or Extension-leg Tripods with Constant-Level Shifting Head and wide-frame European-type construction.

Variable Power is standard on Gurley Transits and Levels:

- Wide range of magnification with **one** eyepiece—zooms for near or distant objects
- Easily adjusts to suit weather and light conditions
- Built-in haze filter

At high power:
- longer shots
- less glare in bright sunlight
- increase in readability
- no glare...high contrast
- blacks and whites stand out

At low power:
- greater field
- brighter field
- decrease of heat waves

We will be pleased to send you further information about both Gurley Optical Plummet Transits and Gurley Variable Power Eyepiece.

Both Optical Plummet and Variable Power are patented.

W. & L. E. Gurley • Union Plaza, Troy, N. Y.

SOUTH

BUILDINGS—BA

▲† **Va., Fort Eustis**—BA 2/16—U. S. Eng., Foot of Front St., Norfolk, 223 unit Capehart Family HOUSING, improvements and utilities, ENG-44-110-61-14. $3,489,000. Plans deposit $10. CD 9/29/58.

HEAVY CONSTRUCTION—LB & CA

▲ **C. W. Regan, Inc.,** 327 Hewes St., Brooklyn, Zone 11, N. Y., LB **$3,574,000,** (6 bidders), excav. constr. East and West TUNNEL APPROACHES, railroad bridge over East Tunnel Approach, 2 superstructures ventilating bldgs., portal tide gate house, tunnel finish and bit. conc. paving, mechanical and electrical work, Contract 2, VIRGINIA. Elizabeth River Tunnel Comn., City Hall Bldg., 235 Plume St., Norfolk, Va. Bids Jan. 11. CD 11/25.

▲ **Howard Constr. Co.,** P.O. Box 3094, Greensboro, N. C., and **Blythe Bros. Co.,** P.O. Box 980, Charlotte, N. C., LB **$1,308,044,** sanitary SEWER outfall lines, HIGH POINT, N. C. City, City Hall, High Point, N. C. Bids Jan. 11. CD 12/20.

▲† **Hardaway Contr. Co.,** 15 E. 11 St., Columbus, Ga., CA **$7,064,189,** construction of POWERHOUSE, Stage II, Walter F. George Project, Chattahoochee River, Inv. No. 01-076-61-12, ALABAMA and GEORGIA. U. S. Eng., 2301 Grant St., Mobile, Ala. Bids Dec. 12. CD 12/28, under LB.

▲ **KENTUCKY**—Commonwealth of Ky., Dpt. Hys., Frankfort, ROADS,
W. E. Ringwald & Son, 42 E. Second St., Chillicothe, O., CA **$1,411,950,** c. conc. pavt. 5.073 mi. Louisville-Lexington, I 64-3 (9) 37, Shelby Co.; CA **$1,411,120,** c. conc. pavt. 4.371 mi. Covington-Lexington, I 75-7(12) 153, Grant Co. Bids Dec. 16, awarded Jan. 11. CD 12/21, under LB.

▲ **Caney Fork Electric Cooperative, Inc.,** West Main St., McMinnville, Tenn., Owner Builds, **$1,185,000,** ELECTRICAL DISTRIBUTION LINES, tie lines, conversion of lines, TENNESSEE. W. M. Wilson, 719 B 17th Ave. S., Nashville, Tenn., engr.

BUILDINGS—LB & CA

▲ **Little Constr. Co.,** P. O. Box 1053, Charlotte, N. C., LB **$2,174,444,** two men's DORMITORIES, CHAPEL HILL, N. C. University of North Carolina, South Bldg., Chapel Hill, N. C. Graves & Toy, 118½ E. 4th St., Charlotte, N. C., archts. Bids Jan. 11. CD 12/14.

▲ **M. B. Kahn Constr. Co.,** 1113 Blossom St., Columbia, S. C., CA Est. **$1,500,000,** projector mfg. PLANT and OFFICE, LEXINGTON, S. C. Argus Cameras Division of Sylvania Electric Products, Inc., 405 4th St., Ann Arbor, Mich. Bids Dec. 22. CD 12/14.

▲ **Cecil's, Inc.,** P.O. Box 1895, Spartanburg, S. C., CA Est. **$2,000,000,** Pinewood SHOPPING CENTER, Byrnes Blvd. and E. Wood St., SPARTANBURG, S. C. C. K. Associates, Inc., c/o W. G. Coker, Pres., Professional Bldg., Spartanburg, S. C. David W. Cecil, 180 N. Dean St., Spartanburg, S. C., archt. CD 11/9/59.

▲ **Richard Naiman & Co.,** 1289 W. Peachtree St., NE, Atlanta, Ga., CA est. **$1,000,000,** RECREATIONAL CENTER, ATLANTA, GA., Bowling Corporation of America, 120 Broadway, New York, N. Y., William L. Rudolph, 622 S. Lake Ave., Pasadena, Calif., archt.

▲ **Leroy Steel, Inc.,** 680 W. Peachtree St., NW, Atlanta, Ga. Owner Builds, **$2,100,000,** 150 RESIDENCES Laurel Hill subdivision, DECATUR, GA

▲ **Grading, Inc.,** 680 W. Peachtree St., NE, Atlanta, Ga. Owner Builds, **$2,800,000,** 280 RESIDENCES, B. A. Hastings subdivision, DECATUR, GA.

▲ **International Constr. Co.,** 3825 Henderson Blvd., Tampa, Fla., CA **$1,000,000,** MOTOR LODGE, TAMPA, FLA. J. W. Walter Corp., Dale Mabry and Columbus Drive, Tampa, Fla. Harry A. MacEwen, 207 Franklin St., Tampa, Fla., archt.

▲ **Perini-Westward Developers, Inc.,** 2669 Okeechobee Rd., West Palm Beach. Owner Builds, $1,500,000, 160,000 sq. ft. SHOPPING CENTER, WEST PALM BEACH, FLA. Weed-Johnson Assocs., 550 Brickell Ave., Miami, Fla., archts.

▲ **Algernon Blair Constr. Co.,** First National Bank Bldg., Montgomery, Ala., CA **$1,329,000,** minerals INDUSTRIAL BLDG., TUSCALOOSA, ALA., University of Alabama, P. O. Box 2107, Tuscaloosa, Ala., Miller, Martin, Lewis & McCowan, Title Guarantee Bldg., Birmingham, Ala., archts. Bids Dec. 20. CD 12/28, under LB.

▲ **Cab Lumber Co.,** 1812 1st Ave., N., Bessemer, Ala. LB **$1,525,000,** Men's RESIDENCE HALL, TUSCALOOSA, ALA., University of Alabama, P. O. Box 2017, Tuscaloosa, Ala. Bids Jan. 12. CD 1/4.

▲ **Bollinger & Martin,** 9118 Westport Rd., Louisville, Ky., Owner Builds, Over **$1,000,000,** 500-row HOUSES and swimming pool, Southwick Redevelopment Area, LOUISVILLE, KY. Augustus & Doumas, 135 Breckenridge Lane, Louisville, Ky., archts.-engrs.

▲ **Frank Messer & Sons, Inc.,** 4612 Paddock Rd., Cincinnati, O., LB **$1,000,000,** underground REPAIR STATION, WILLIAMSTOWN, KY. American Telephone & Telegraph Co., Kroger Bldg., 1014 Vine St., Cincinnati, O. Bids Dec. 29, awarded Jan. 6. CD 12/20.

MANITOWOC SECTIONAL BARGES

■ SUPPORT CRANE AND BATCHING PLANT

■ ARE TOWED WITH EQUIPMENT OVER 100 MILES

Versatile Manitowoc Sectional Barges provided a "floating concrete plant" during recent construction of a "port of refuge" at Big Bay, Michigan. Grouting mixed on the spot was poured over rip-rap in cells forming the breakwater.

The Manitowoc Type H Sectional Barge pictured measures 80′ x 30′ x 6′ and is comprised of seven individual sections, firmly bolted together to form an ample, seaworthy platform for a Manitowoc 20 ton Crane, bins, the mixer and miscellaneous equipment. The barge sections were trucked to Hancock, Michigan, and the assembled barge with equipment shown was towed over 100 miles, via Lake Superior, to the job site.

Manitowoc Sectional Barges are quickly assembled and taken apart . . . can be shipped by truck or rail. Separate sections — in two basic sizes — plus a variety of optional equipment, make any size, shape, or type of barge possible. For full information contact your Manitowoc distributor or write direct.

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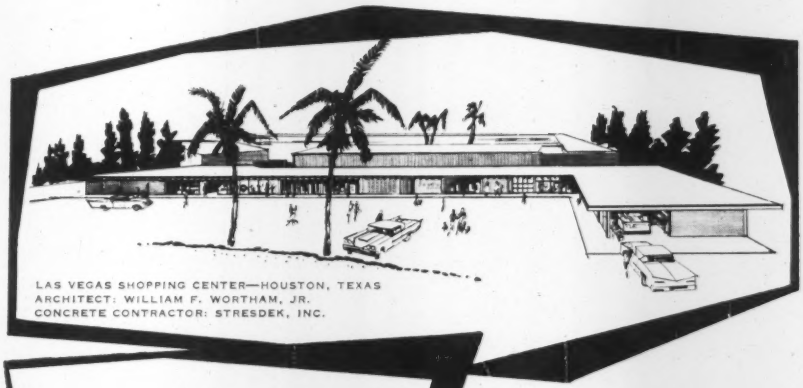
The Prescon System of Post-Tensioning Prestressed Concrete Works for You From Design and Engineering to Completion



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ARCHITECT: WILLIAM F. WORTHAM, JR.
CONCRETE CONTRACTOR: STRESDEK, INC.

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Transmission of speech is clear, distinct and absolutely static-free over a distance of 30 miles or more.

Photos depict phones installed by Fred Electric Co. of Mineola, N. Y. for Poirier & McLane Corporation, N.Y.C., engineers — contractors for construction of the Main Force Tunnel in Brooklyn. These phones were especially made from our basic Model SER with 6" bell, auxiliary horn and red indicator light.

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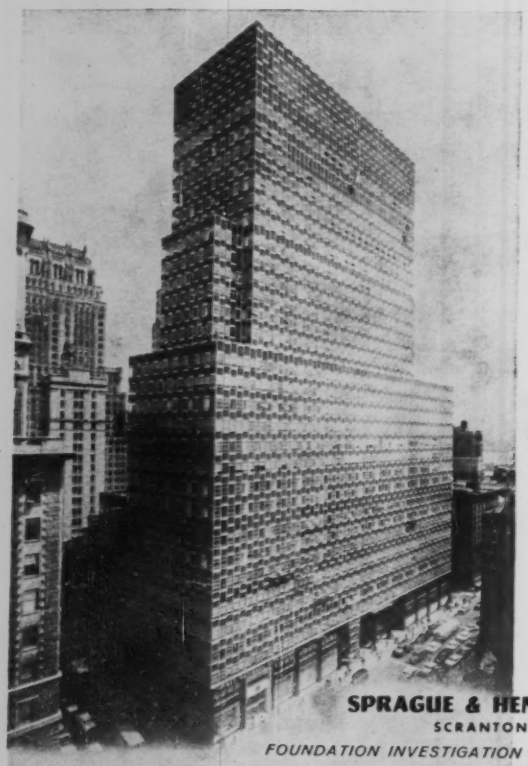

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NEW YORK

SPRAGUE & HENWOOD, Inc.
SCRANTON 2, PA.

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PRESSURE GROUTING • MASONRY DIAMOND DRILLING

New York—Philadelphia—Nashville—Pittsburgh—Tucson—Grand Junction, Colo.—Bachans, Nfld.

▲ **Carl Batson, Inc.**, 4229 Frank Rd., Nashville, Tenn., Owner builds **$3,000,000**, 700 RESIDENCES, Harding Place Plaza subdivision, NASHVILLE, TENN.

MIDDLE WEST

HEAVY CONSTRUCTION—BA

▲ **Illinois**—BA 3/1—U. S. Eng., 420 Locust St., St. Louis 2, Mo., East St. Louis PUMPING STATION, East St. Louis and Vicinity, Proj. Item II-F, brick, masonry and rein.-con. emergency closure and gatewell structures, Madison and St. Clair Counties, ENG-23-065-61-48, $1,500,000. Extended date. CD 1/4.

BUILDINGS—LB & CA

▲ **Maxon Constr. Co.**, 2600 Far Hills St., Dayton, O., LB **$1,872,279**, St. Elizabeth's HOSPITAL addn., DAYTON, O. Franciscan Sisters of the Poor, St. Elizabeth's Hospital, 49 Hopeland St., Dayton, O. Bids Jan. 10. CD 12/14.

▲† **George A. Rutherford Co.**, 1100 W. 9th St., Cleveland, Zone 13, O., LB **$1,010,000**, (9 bidders), energy conversion LABORATORY, CLEVELAND, O. National Aeronautics & Space Admin., Lewis Research Center, 21000 Brookpark Rd., Cleveland, Zone 35, O. Bids Jan. 12.

▲† **John C. Long, Inc.**, 800 W. Jackson Blvd., Chicago, Ill., CA **$1,172,200**, recruit BARRACKS, 2nd increment of Second Camp, Naval Training Center, Spec. 31155.60, GREAT LAKES, ILL. Dist. P. Wks. Office, Bldg. 1A, Great Lakes, Ill. Bids Dec. 20. CD 11/29.

MISSISSIPPI TO ROCKIES

BUILDINGS—BA

▲ **Minn., Anoka**—BA 1/24—Bd. Educ. Independent School Dist. No. 11, two ELEMENTARY SCHOOLS, Coon Rapids. $1,400,000. Plans deposit $40 each. Thorsen & Thorshov, 1009 Marquette Ave., Minneapolis, Minn., archts. L. D. Freedland, 1009 Marquette Ave., Minneapolis, Minn., engr. CD 10/19.

HEAVY CONSTRUCTION—LB & CA

▲ **Northern States Power Co.**, 15 S. 5 St., Minneapolis, Minn., Owner Builds, **$4,000,000** ELECTRIC DISTRIBUTION SYS. extension imprvt., Minneapolis; **$620,000** SUBSTATION, 20,000 kva and four 13,800 volt feeders northeast of Minneapolis; **$175,000**, increase capacity of Substation, St. Louis Park; **$150,000** Riverside Generating Station imprvts., Minneapolis; **$120,000** street lighting, Bloomington (P. O. Minneapolis); **$1,850,000** electric distribution sys. addns. St. Paul, MINNESOTA. Grand Total $6,915,000. CD 1/12.

▲† **MacDonald Constr. Co.**, 1310 S. Grand, St. Louis, Mo., LB **$3,796,000**, 2nd Phase Jefferson National Memorial Proj. on river front, incl. excav. for 630 ft. ARCH and UNDERGROUND VISITOR CENTER at its base, grand stairway to arch, 4-lane drive, etc., ST. LOUIS, MO. National Park Service, Jefferson National Memorial, 11 N. 4 St., St. Louis 2, Mo. Bids Jan. 12. CD 12/21.

▲† **Atlantic, Gulf & Pacific Co.**, 15 Park Row, New York 38, N. Y., LB **$1,343,270**, DREDGING Houston Ship Channel, Morgans Point to near Baytown, ENG-41-243-61-27, TEXAS. U. S. Eng., Box 1229, Galveston, Tex. Bids Jan. 12. CD 12/28.

▲ **Wyoming Improvement Co.**, Rapid City, S. D., LB **$1,112,395**, area No. 2; LB **$537,477**, area No. 4; LB **$373,692**, area No. 5; STREET paving, CASPER, WYO. City, City Hall, Casper, Wyo. Bids Jan. 12. CD 12/28:
Western Paving Co., Laramie, Wyo., LB **$534,914**, area No. 1 (north Casper), street paving, (Casper, Wyo.);
Big Horn Constr. Co., Sheridan, Wyo., LB **$897,372**, area No. 3, street paving, (Casper, Wyo.);
A. H. Read, 706 W. 19th St., Cheyenne, Wyo., LB **$782,470**, area No. 6, street paving, (Casper, Wyo.).

BUILDINGS—LB & CA

▲ **Steinberg & Son**, 2111 Harwood St., Dallas, Tex., CA **$1,197,700**, Thomas C. Marsh Junior High SCHOOL, DALLAS, TEX. Dallas Ind. School Dist., Dallas, Tex. CD 12/5.

▲ **Coleman Development Corp.**, c/o 4051 E. Houston St., San Antonio, Tex., Owner builds **$1,750,000**, East Town SHOPPING CENTER, SAN ANTONIO, TEX. CD 1/13.

▲ **Mead & Mount Constr. Co.**, 518 17th St., Denver, Colo., CA approx. **$7,000,000**, 21 story, basement, OFFICE, 3 penthouses, 17th & California Sts., DENVER, COLO., Western Federal Savings & Loan Assocs., 1630 Stout St., Denver, Colo., Raymond H. Ervin & Assocs., 1500 Denver Club Bldg., Denver, Colo., archts. Awarded Dec. CD 10/19/59, under Industrial Federal Savings & Loan Assocs.

FAR WEST

HEAVY CONSTRUCTION—BA

▲ **CALIFORNIA**—BA 2/23—State Div. Hys., 1120 N St., Sacramento, ROADS,
Alameda Co.—1.7 mi. eight lane freeway, MacArthur Freeway (US Hy. 50) between 0.3 mi. west of Grand Ave. and 14 Ave., Oakland, incl. six bridges. $5,000,000. CD 11/13/59.

BUILDINGS—BA

▲ **Calif., Los Angeles**—BA 3/8—Bd. Supervs. Los Angeles Co., Hall of Records, County men's DETENTION CENTER, **$13,066,731;** prison equipment for Detention Center. **$3,242,420.** Extended Date. Albert C. Martin & Assoc., 333 S. Beaudry St., Los Angeles, Calif., Charles Luckman & Assoc., 9920 Sunset Blvd., Los Angeles, Calif., Kenneth S. Wing, 30 Linden Ave., Long Beach, Calif. and William Allen, 6112 Wilshire Blvd., Los Angeles, Calif., archts. CD 9/22.

HEAVY CONSTRUCTION—LB & CA

▲† **Seaview Lumber Co.** (Arthur A. Danekas, W. C. Ellis and John Martin), 1645 St. Malo Ave., La Porte, Calif., LB **$4,587,000,** (4 bidders), 300 unit FAMILY HOUSING, Mountain Home Air Force Base, Inv. 61-24, MOUNTAIN HOME, IDAHO. Procurement Office, Mountain Home Air Force Base, Mountain Home, Calif. Hummel, Hummel, & Jones, 1324 Idaho St., Boise, Idaho, archts. Bids Jan. 12. CD 12/15.

▲ **WASHINGTON**—State Hy. Comn., Dpt. Hys., Olympia. Bids opened 1/10, BRIDGES,
Bergersen & Roberts and Earley Constr. Co., 2015 Center St., Tacoma, Wash., CA **$1,506,336,** four bridges, Primary State Hys. 1 and 5, Renton, King Co. CD 1/13, under LB.

▲ **UTAH**—State Rd. Comn., State Capitol, Salt Lake City Zone 14, bids opened 1/10, ROADS,
Gibbons & Reed Constr. Co., 825 W. 9 North, Salt Lake City 16, Utah LB **$1,302,530** Est. $1,300,000, (9 bidders), 3.404 mi. 4-lane hy., 1-3 span steel beam structure and 1 prestressed concrete beam and 1 concrete rigid structure, Magna-Garfield, Salt Lake Co. CD 12/27.

▲ **Viking Co.,** P. O. Box 8, Covina, Calif., LB **$1,299,717,** est. $1,376,000, (10 bidders), convert Wherry Housing to PUBLIC QUARTERS, Marine Corps Air Facility, Spec. 19541, EL TORO, CALIF. 11th Naval Dist. P. Wks., 1220 Pacific Hy., San Diego 1, Calif. Flewelling & Moody, 766 Colorado Blvd., Los Angeles 41, Calif., archts. Bids Jan. 11. CD 12/16.

▲† **Hydraulic Dredging Co.,** Central Bldg., Oakland Calif., CA **$6,181,257,** DREDGING Sacramento River Ship Channel Mile 18.2 to Mile 26.8 and plugs at Mile 36.0 and Mile 41.0 nearly 19,000,000 cu. yd. excav. Spec. 2494 ENG-04-167-61-27, CALIFORNIA. U. S. Eng., 1209 8 St., Sacramento, Calif. Bids Jan. 10 Awarded Jan. 14. CD 1/13, under LB.

▲ **HAWAII** — State, 869 Punchbowl and King Sts., Honolulu, bids opened 12/22, ROADS,
Territorial Contractors, 803 Mapunapuna St., Honolulu, Hawaii LB **$1,915,050,** (4 bidders), Kauai Belt Road, Kalihiwai Section, Emergency Relief Proj. No. ER-7(1) Unit 2, District of Hanalei, Kauai Co. CD 11/30.

BUILDINGS—LB & CA

▲ **Gilbert & Dolan Enterprises Inc.,** 4747 N. 16th St., Phoenix, Ariz., LB **$1,574,000,** Barrow Neurological INSTITUTE WING, St. Josephs Hospital, PHOENIX, ARIZ., St. Josephs Hospital, Third Ave., Thomas, Rd., Phoeniz, Ariz., Lescher & Mahoney, Title & Trust Bldg., Phoeniz, Ariz., archts., Bids Jan. 10.

▲ **Graff & James,** Box 82, Medford, Ore., CA **$1,104,067,** (7 bidders), 70 bed HOSPITAL ADDN., MEDFORD, ORE. Rogue Valley Hospital, Medford, Ore. CD 1/4, under LB.

▲ **Beckner Constr. Co.,** 2650 River Ave., South San Gabriel, Calif., CA **$2,167,950,** Savannah HIGH SCHOOL, ANAHEIM, CALIF. Anaheim Union High School Dist., 123 North Citron Ave., Anaheim, Calif. Bids Dec. 20. CD 12/29, under LB.

▲ **Diverco Constructors,** 10238 Lakewood Blvd., Downey, Calif., LB **$2,214,400,** (5 bidders), cement block HIGH SCHOOL, LOMPOC, CALIF. Lompoc Union School Dist., 200 South "M" St., Lompoc, Calif. Bids Jan. 10. CD 12/29.

▲ **Main Cornice Works,** 7219 W. Beverly Blvd., Los Angeles, Calif., LB **$1,184,000** est. $1,918,000, (6 bidders), convert Wherry Housing to PUBLIC QUARTERS, Naval Station, Spec. 19562, SAN DIEGO, CALIF. 11th Naval Dist. P. Wks., 1220 Pacific Hy., San Diego 1, Calif. Frank L. Hope & Assoc., 1475 6 Ave., San Diego 1, Calif., archt. Bids Jan 13. CD 12/20.

▲ **Q. C. Lum,** 1935 N. King St., Honolulu, Hawaii, CA **$5,350,000,** 296 HOMES (first increment), WAIPAHU, HAWAII. Robinson Estate, 7th Floor, Capital Investment Bldg., Honolulu, Hawaii. Edward Miyamasu, Rm. 308, 931 University Ave., Honolulu, Hawaii, archt. R. M. Towill Corp., 233 Merchant St., Honolulu, Hawaii, engr.

AMERICANS ABROAD

HEAVY CONSTRUCTION—LB & CA

† **Kingdom of Laos**—U. S. Bureau P. Rds., Dpt. Commerce, c/o U. S. Embassy, Vientiane, Laos, cancelled bids to have been opened Jan. 31, GRADING, installation metal pipe culverts on 99 kilometers and 873-36 meters of clearing, grubbing, excav., unclassified excav. Nam Ca Dinh-Nam Hin Boun, Thakehek Province Proj. Laos RIG 13-D-1. CD 11/23.

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Faster, easier, better way to produce very thin, self-bonding cement toppings . . . from featheredge to ¼"

Now . . . from the makers of Weld-Crete® . . . the original concrete bonding agent . . . comes Larsen-Mix . . . a cement mix with built-in bonding ability.

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Here are just a few:

1. To touch-up poured concrete when forms are removed.
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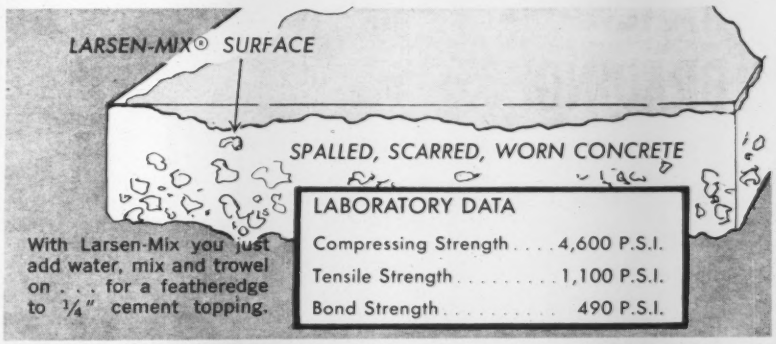
3. To level concrete before installing resilient flooring.
4. To use as a bonding mortar for pre-cast concrete objects, including slate, marble etc.

You'll find Larsen-Mix foolproof in terms of application. For economy, coarse sand may be added to fill deep cracks and pitted concrete. Anti-slip surfaces may be obtained by adding abrasive grains. Color may be added to traffic markings. Larsen-Mix is non-fuming, contains no volatile organic solvents. It is another fine product of Larsen Products Corporation, Bethesda 14, Maryland.


LARSEN-MIX® SURFACE
SPALLED, SCARRED, WORN CONCRETE
LABORATORY DATA
Compressing Strength . . . . 4,600 P.S.I.
Tensile Strength . . . . . 1,100 P.S.I.
Bond Strength . . . . . 490 P.S.I.
With Larsen-Mix you just add water, mix and trowel on . . . for a featheredge to ¼" cement topping.

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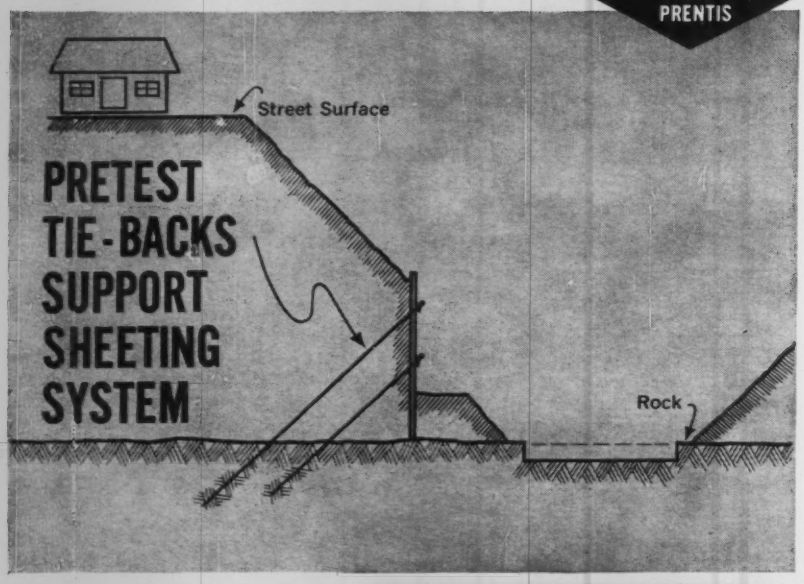
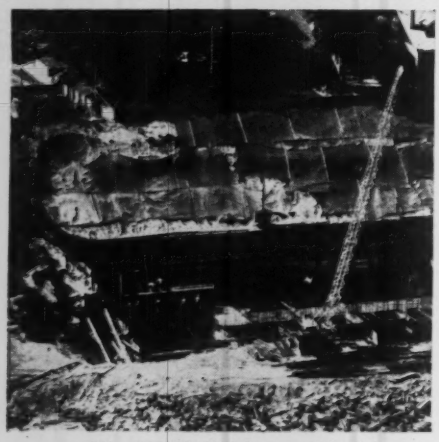


NOVEL PLAN ELIMINATES NEED OF RAKER BRACING



170' x 65' lot is 80' below street level.

The above-pictured system of horizontal wood sheeting and soldier beams, extending 30 ft. to subgrade, dependably retained a heavy earth bank—without the customary bracing of raker beams.

An unusual method (on which patent application has been made) employed pretest wire tie-backs, on the exterior side of the sheeting, to provide the necessary support. Two tensioned wires were fastened to each soldier beam and, on the other end, were grouted into sockets in the bedrock.

Besides proving dependable and economical, the new method—one of many pioneered by Spencer, White & Prentis—has the further advantage of leaving the excavation free and clear for the contractor's operations.

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PROPOSED PROJECTS

WATER SUPPLY

▲ **Mo., St. Louis County**—St. Louis County Water Co., 8390 Delmar Blvd., University City 24, 36 m.g. per day addn. to north county WW on Missouri River 3 mi. upstream from Hall's Ferry Rd. near Charbonier Rd. Over $3,000,000. Bids 1963 or 1964. CD 1/17/57.

▲ **Va., Portsmouth**—City, Municipal Bldg., Portsmouth, approx. 20 mi. high pressure watermain, from Suffolk to Portsmouth, $3,000,000. Bids late 1961 or early 1962. CD 11/11/55.

SEWERS, WASTE DISPOSAL

Conn., North Haven—Town, Town Hall, sewers, Dist. 2, East Side, Clintonville, $500,000; sewers, Dist. 3, Center Area, $500,000. Philip W. Genovese & Assocs., 294 Elm St., New Haven, Conn., consult. engrs. CD 8/17.

▲ **Mich., Pontiac**—City, City Hall, sewage plant. $3,500,000. Jones, Henry & Williams, Security Bldg., Toledo, O., consult. engrs. CD 12/6.

▲ **O., Strongsville**—City, City Hall, sewers, $2,630,000. John Petsche, 13868 Bennett Rd., North Royalton, Zone 33, consult. engr. CD 12/2.

▲ **N. Y., New York**—Dpt. P. Wks., Municipal Bldg., New York, Zone 7, Proj. S-146, 56 St. incinerator alterations. $3,000,000. To go ahead after 1961.

▲ **N. Y., New York**—Dpt. P. Wks., Municipal Bldg., New York, Zone 7, Proj. S-143, incinerator and garage, East 73 St. Rehabilitation Proj. for Districts 6 and 8. $6,735,000. To go ahead in 1961.

▲ **Mo., Kansas City**—City, City Hall, sewage treatment sys. to clean up Missouri River. To run over 20 years. $75,000,000. Black & Veatch, 1500 Meadow Lake Parkway, Kansas City, Mo. and Burns & McDonnell, 4600 E. 63, Kansas City, Mo., consult. engrs. CD 11/14.

▲ **Ore., Springfield**—City, City Hall, bond election Feb. 7, sewerage system imprvs., extension, $1,960,000.

▲ **Va., Fairfax**—Fairfax County Bd. Supvrs., 4 sewage treatment plants, two for Chantilly area, two for Centreville; and trunk sewer lines, $1,500,000. Massey Engineers, Fairfax, Va. and Alexander Potter Assoc., 50 Church St., New York, Zone 7, N. Y., consult. engrs. CD 2/13/59.

BRIDGES

▲ **N. Y., New York**—Dpt. P. Wks., Municipal Bldg., New York, Zone 7, Proj. PW-178, high level fixed bridge over Eastchester Creek replacing existing Bascule Bridge, Bronx Boro. $2,730,000. To go ahead after 1961.

STREETS AND ROADS

▲ **Calif., San Jose**—Bd. Supervs. Santa Clara Co., Civic Center, 1 and Rosa Sts., $70,000,000 bond election Mar. 28, ROADS and expressways. Bond election date extended. CD 11/28.

▲ **Conn., Westport**—Town, Town Hall, road reconstruction, various locations, $2,000,000.

▲ **Ind., Fort Wayne**—Bd. P. Wks., City Hall, 1961 street widening program: State Rd. from Circumurban to Randallia Dr.; Lake Ave. from Randallia to Circumurban Dr.; Oxford St. from Anthony Blvd. to Wayne Trace; McKinney Ave. from Anthony Blvd. to Wayne Trace; Calhoun St. from Paulding Rd. to Tillman Rd., $1,500,000; resurface 15.07 mi. of 65 streets in city, $341,721. Ed. Green, city engr. CD 12/6.

▲ **O., Cincinnati**—Bd. Comrs. Hamilton Co., Courthouse, cross-county hy., three bridges, Section B, 4-lane 2 mi. divided hy. from Ridge Rd. to Kenwood Rd., $2,500,000. Vogt, Ivers, Seaman & Assocs., 34 W. 6th St., consult. engrs. Bids in March. CD 11/15.

▲ **PENNSYLVANIA**—Pa. Hwys. Dpt., 506 North Office Bldg., Harrisburg, ROADS,
Luzerne Co. — 3.18 mi. Interstate Rte. 3, Anthracite EXPRESSWAY between Lake Nuangola and Penobscot Mountain, $4,000,000. Bellante and Clauss, Inc., Mears Bldg., Scranton, Pa., consult. engr.
6.48 mi. Interstate Rte. 3, Anthracite EXPRESSWAY, between Lake Nuangola and a point .5 mi. west of Rte. 309 at Nescopeck Pass, $7,000,000. Yule, Stricklen, Jordan & McNee, Cedar Cliff Drive, Camp Hill, Pa., consult. engrs.

▲ **Tex., San Antonio**—City, City Hall, voted bonds Jan. 10, road 90 West and Kelly ACCESS ROAD, $5,600,000; North Expressway ACCESS ROAD, $3,500,000. CD 12/28.

EARTHWORK, WATERWAYS

Connecticut—State P. Wks. Dpt., 165 Capitol Ave., Hartford, flood control, place North Creek in Conduit, Bristol. $659,000.

▲ **N. Y., Brooklyn**—Dpt. Marine & Aviation, Battery Maritime Bldg., New York, Zone 4, Proj. D-276, reconstr. BULKHEAD WALL between 28 St. Slip and 35 St. Pier, Gowanus Bay. $1,060,000. To go ahead 1961.

AIRPORTS

▲ **Alaska, Anchorage**—TERMINAL ADDN.—State Dpt. P. Wks., State Office Bldg., Juneau, plans by Fay, Spofford & Thorndike and Tryck, Nyman & Assocs., 545 E. 4 St., Anchorage, Alaska, 2 story, 91,000 sq. ft. terminal addn. Anchorage International Airport. $4,500,000. May start this year.

▲ **Alaska, Fairbanks**—TERMINAL—State Dpt. P. Wks., State Office Bldg., Juneau, plans by Fay, Spofford & Thorndike and Tryck, Nyman & Assocs., 545 E. 4 St., Anchorage, Alaska, 69,000 sq. ft. terminal at Fairbanks International Airport. $2,500,000. May start this year.

▲† **Calif., Point Mugu**—LAUNCH COMPLEX—Dist. P. Wks. Officer, 11th Naval Dist., 1220 Pacific Hy., San Diego 32, accepting applications until March 1 from contractors wishing to prequalify on Contract Branch, Code C-310, Air Force Launch Complex 2, Naval Missile Facility for 2 story, rein.-con. blast resistant launch operations bldg. with three service bldgs., technical support bldg., single story frame structures; diesel generator and pump house with related appurtenances, Point Arguello. $8,000,000-$10,000,000.

UNCLASSIFIED

▲ **D. C., Wash.**—MEMORIAL—Franklin Delano Roosevelt Memorial Comn., Tariff Bldg., F St. between 7th and 8th Sts. N. W., plans by William F. Pedersen & Bradford S. Tilney, 21 E. 40th St., New York, N. Y., F. D. Roosevelt Memorial, West Potomac Park, $4,254,366.

▲ **N. Y., Brooklyn**—LIGHTING SYS.—Dpt. Water Supply, Gas & Electric, Municipal Bldg., New York, Zone 7, Proj. WG-34, rehabilitation of lighting sys., Prospect Park. $2,200,000. To go ahead after 1961.

▲ **N. Y., Brooklyn**—PLATFORM EXTENSION—New York City Transit Auth., 370 Jay St., Brooklyn 1, Proj. T-5K Nevins St. Station platform lengthening and realignment of trackway, Nevins St. to Atlantic Ave. Stations IRT Div. $2,450,000. To go ahead 1961.

▲ **N. Y., Flushing**—PARKING DECK—Dpt. P. Wks., Municipal Bldg., New York, Zone 7, Proj. TF-408, parking deck for Department of Traffic, Queens Boro. $1,050,000. To go ahead 1961.

▲ **N. Y., New York**—Dpt. Marine & Aviation, Battery Maritime Bldg., New York, Zone 4, Proj. D-282, modification PIERS 59, 60, 61 and 62, North River. $9,755,000. To go ahead after 1961.

▲ **N. Y., New York**—Dpt. Marine & Aviation, Battery Maritime Bldg., New York 4, Proj. D-277, WHARF SHIPPING TERMINAL between Pike Slip and Gouverneur Slip, East River. $8,000,000. To go ahead after 1961.

▲ **N. Y., New York**—Dpt. Marine & Aviation, Battery Maritime Bldg., New York, Zone 4, Proj. D-260, development North River WATERFRONT, West 59, West 70 Sts. $19,000,000. To go ahead after 1961.

▲ **N. Y., New York**—Dpt. Marine & Aviation, Battery Maritime Bldg., New York 4, Proj. D-254, SEAPLANE BASE and parking facilities, East 23 St., East River. $1,475,000. To go ahead 1961.

▲ **N. Y., New York**—WHARF SHIPPING TERMINAL—Dpt. Marine & Aviation, Battery Maritime Bldg., New York, Zone 4, Proj. D-278, wharf shipping terminal between Robert F. Wagner, Sr. Pl. and Market Slip, East River. $7,570,000. To go ahead after 1961. CD 9/9/55.

PUBLIC BUILDINGS

▲ **Calif., Costa Mesa**—SCHOOLS—Costa Mesa Union School Dist., 1857 Placentia Ave., voted $3,000,000 bonds Dec. 6, schools.

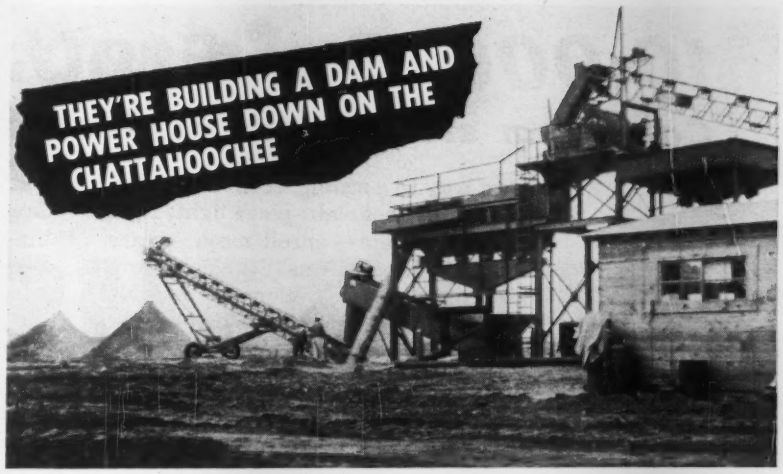
▲ **Conn., Groton**—MUNICIPAL BLDG.—Borough, Borough Hall, Municipal Bldg. $1,000,000.

▲ **Conn., Storrs**—RESEARCH CENTER, etc.—State Pub. Wks. Dpt., 165 Capitol Ave., Hartford, engineering research and development center, University of Connecticut. $1,820,000.

▲ **Del., Newark**—HIGH SCHOOL—Newark Bd. Educ., Newark, voted bonds, high school, $3,000,000, E. William Martin, 830 West St., Wilmington, archt. CD 10/21.

▲ **Ga., Hartwell**—PRISON—Georgia State Dpt. of Correction, 415 Capitol Bldg., Atlanta, plans by Albany Architects & Engineers, P. O. Box 1778, Albany, 250,000 sq. ft. 2 story, state prison, $4,000,000. J. L. Lindsey, 415 Pine Ave., Albany, Ga., struct. engr.

▲ **Ill., Chicago**—SCHOOLS—Bd. Educ., 228 N. LaSalle St.,
Ericson Elementary School, Central Park and 5th Aves., $1,098,000.
Yale Elementary School addn., 7025 S. Princeton Ave., $1,250,000.
elementary school, 15th and Albany Ave., $1,250,000.
elementary school, 19th St. and Damen Ave., $1,000,000.
elementary school, 63rd St. and South Park Ave., $1,250,000.
elementary school, 66th St. and Harvard Ave., $1,250,000.
elementary school, 67th St. and Normal Ave., $1,250,000.
school, Washington Blvd. and Albany Ave., $1,250,000.
elementary school, area near present Pope and Howland Schools, $1,000,000. Bids in 1961. CD 6/11/57.



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SCREEN NO.	PLANT FEED % PASSING	SAND PRODUCT % PASSING	CORPS OF ENGINEERS SPECS.
4	96.5	95.1	95-100
8	91.4 hi	83.5	80-90
16	80.7 hi	67.0	55-75
30	54.4	45.8	30-60
50	21.3	27.1	12-30
100	4.8	7.9	4-9
PAN	*0.0	0.0	
FINENESS MODULUS		2.74	2.40-2.90

*No decant performed—approximately 20% of minus 100 mesh material estimated to be silt.

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Where the pit run material was out of specifications in percentage passing the #8 and #16 screen, and the minus #100 mesh material was very near the minimum limit and contained an appreciable silt content, the final product was brought well within specifications and the percentage of minus 100 mesh fines increased while at the same time the silt was removed.

Eagle Equipment cannot "create" sand that does not exist in a deposit, but it can classify sand so as to reject or retain certain meshes to produce a final gradation that meets specs.

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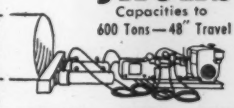

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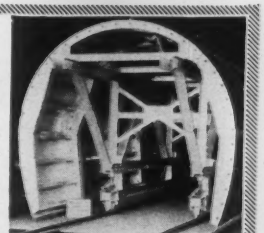

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▲ **Ill., Chicago**—SCHOOLS—Bd. Educ., 228 N. La Salle St., Zone 1, plans by Graham Anderson, Probst & White, 201 N. Wells St., Zone 6, Cooper Upper Grade Center School, 1624 W. 19th St. **$1,208,000.** CD 1/18.

▲ **Ill., Elgin**—CIVIC CENTER—City, City Hall, Civic Center, 5,000 seat arena. **$1,500,000.**

Ill., Peoria—SCHOOL ADDN.—Richwoods Community High School Dist. 312, 6301 N. University Ave., Peoria, bond election Mar. 4, high school addn. **$950,000.**

▲ **Ind., New Albany** — HOSPITAL — New Albany-Floyd Co. Bldg. Auth., Court House, plans by Walker, Applegate, Oakes & Ritz, 218 Elsby Bldg., hospital expansion. **$3,950,985.** Southern Engineering Co., 322 W. Jefferson, Louisville, Zone 2, Ky., consult. engr. CD 9/30.

Iowa, Reinbeck—SCHOOL—Bd. Educ., Community School Dist. voted bonds Dec. 14, elementary school. **$532,400.** Dougher-Frevert-Ramsey, 302 Garver Bldg., Des Moines, archts. Bids about Mar. 1. CD 12/12.

▲ **Mich., Bloomfield Hills**—Bd. Educ., 4200 Andover, bond election Jan. 30, SCHOOLS ADDN., high school, elementary school. **$4,135,000.**

▲ **Mich., Detroit**—Wayne County Bd. Supervs., City-County Bldg., Zone 26, 7 story COURT JUSTICE bldg., Clinton, St. Antoine, Raynor and Gratiot Aves. **$3,500,000.**

▲ **Mont., Billings**—SCHOOLS—School Dist. No. 2, 101 10th St. W., Billings, West High School addn., **$535,000;** South Billings Junior High School and addn. Lewis & Clark Junior High School, **$1,700,000;** 2 elementary schools and addns. to several schools, **$1,200,000.** CD 12/17/57.

▲ **N. J., Fort Lee**—HIGH SCHOOL ADDN.—Bd. Educ. Borough Fort Lee, Whiteman St., plans by Chas. Cleveland, 214 Main St., Hackensack, high school addn., Lemoine Ave. **$1,600,000.**

▲ **N. J., Newark**—LIBERAL ARTS, etc.—Rutgers University, University Pl., New Brunswick, plans by Kelly & Gruzen, 60 Park Pl., 2 liberal arts bldgs., library and science, Washington and High Sts. **$6,500,000.** To go ahead 1962.

▲ **N. J., Trenton**—HOUSING—Trenton Housing Auth., 875 New Willow St., plans by Kramer, Hirsch & Carchidi, 115 West State St., Trenton, N. J., 350 unit low-rent public housing, off Lincoln Ave. **$5,000,000.**

▲ **N. Y., Brooklyn**—ACADEMIC BLDG.—Bd. Higher Educ., 535 E. 80 St., New York, Zone 21. Proj. HN-131, academic bldg. Brooklyn College. **$6,400,000.** To go ahead after 1961.

▲ **N. Y., Brooklyn**—HIGH SCHOOL—Bureau Constr., Bd. Educ., 42-15 Crescent St., Long Island City, Zone 1, Proj. E-814, Sheepshead Bay High School, Batchelder St., Aves. X and Y. **$6,500,000.** To go ahead after 1961.

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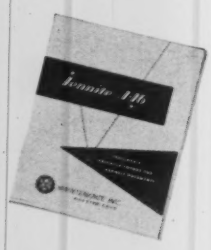

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▲ **N. Y., Brooklyn**—JUNIOR HIGH SCHOOL—Bureau Constr., Bd. Educ., 42-15 Crescent St., Long Island City, Zone 1, Proj. E-559 Junior High School 111, vicinity of Knickerbocker and Willoughby Aves. **$3,700,000.** To go ahead after 1961.

▲ **N. Y., Brooklyn**—JUNIOR HIGH SCHOOL—Bureau Constr., Bd. Educ., 42-15 Crescent St., Long Island City, Zone 1, Proj. E-498, Junior High School 78, Island Ave. and E. 68 St. **$3,400,000.** To go ahead 1961.

▲ **N. Y., Brooklyn**—JUNIOR HIGH SCHOOL—Bureau Constr., Bd. Educ., 42-15 Crescent St., Long Island City, Zone 1, Proj. E-546, Junior High School 68, Flatlands Ave. and E. 82 St. **$3,400,000.** To go ahead 1961.

▲ **N. Y., Flushing**—HIGH SCHOOL—Bureau Constr., Bd. Educ., 42-15 Crescent St., Long Island City 1, Proj-E-196. Francis Lewis High School, Utopia Parkway, 59 Ave. and Fresh Meadow Lane. Queens Boro. **$8,000,000.** To go ahead after 1961.

▲ **N. Y., New York**—JUNIOR HIGH SCHOOL—Bureau Constr., Bd. Educ., 42-15 Crescent St., Long Island City, Zone 1, Proj. E-917, Junior High School 22, Columbia and East Houston Sts. **$5,200,000.** To go ahead after 1961.

▲ **N. Y., Fresh Kills**—MARINE UNLOADING PLANT—Dpt. P. Wks., Municipal Bldg., New York, Zone 7, Proj. S-111, marine unloading plant for Sanitation Department, Richmond Boro. **$9,350,000.** To go ahead after 1961.

▲ **N. Y., New York**—YOUTH HOUSE FOR GIRLS—Dpt. P. Wks., Municipal Bldg., New York, Zone 7, Proj. WL-26, youth house for girls, Manida and Spofford Sts., for Department of Welfare, Bronx Boro. **$6,290,000.** To go ahead after 1961.

▲ **N. Y., New York**—SANITATION CENTER—Dpt. P. Wks., Municipal Bldg., New York, Zone 7, Proj. S-140, South Bronx Sanitation Center, incl. incinerator, marine transfer station and garage for Districts 20, 21, 22 and 23, Bronx Boro. **$26,000,000.** To go ahead after 1961.

▲ **N. Y., New York**—POLICE HEADQUARTERS, etc.—Dpt. P. Wks., Municipal Bldg., New York, Zone 7, Proj. PO-57, police headquarters-civic center. **$19,840,000.** To go ahead 1962.

▲ **N. Y., New York**—HIGH SCHOOL—Bureau Constr., Bd. Educ., 42-15 Crescent St., Long Island City, Zone 1, Proj. E-547 2,500 student West Side High School, vicinity Amsterdam Ave. and 86 St. **$6,500,000.** To go ahead after 1961.

▲ **N. Y., New York**—JUNIOR HIGH SCHOOL—Bureau Constr. Bd. Educ., 42-15 Crescent St., Long Island City, Zone 1, Proj. E-596 Junior High School 145, Melrose Ave., Bronx Boro. **$3,700,000.** Site acquisition in 1961. To go ahead after 1961.

▲ **N. Y., New York**—JUNIOR HIGH SCHOOL—Bureau Constr., Bd. Educ., 42-15 Crescent St., Long Island City, Zone 1, Proj. E 594 Junior High School 201, North Harlem Ave. **$3,700,000.** Site acquisition in 1961.

▲ **N. Y., Woodhaven**—JUNIOR HIGH SCHOOL—Bureau Constr., Bd. Educ., 42-15 Crescent St., Long Island City, Zone 1, Proj. E-553 Junior High School 60, Woodhaven Area, Queens Boro. **$3,700,000.** Site acquisition in 1961.

▲ **O., Akron**—ADMINISTRATION, etc.—University of Akron, 302 E. Buchtel St., college-administration bldg., **$1,800,000-$2,000,000;** business administration-law bldg., **$1,200,000;** 3 level, 400 car parking deck near E. Buchtel and Elwood Ave., **$640,000.**

▲ **O., Akron**—SCHOOL—Bd. Educ., 70 Broadway, Northwest High School, Fairlawn Area, **$3,000,000.** Bids in 1961. CD 11/16/50.

▲ **O., Cincinnati** — SCHOOLS — Northwest Local School Bd. of Educ., Poole Rd., high school, Cheviot Rd., elementary scool, Hamilton Ave., **$2,500,000.**

▲ **O., Cleveland**—General Services Admin., 19th and F Sts. N.W., Wash., D. C., plans by Outcalt, Guenther & Van Buren, 13124 Shaker Sq., Shafer, Flynn & Williams, 1740 E. 12th St. and Dalton-Dalton Assocs., The Arcade, all of Cleveland, FEDERAL OFFICE, **$48,000,000.** (No appro.). CD 6/28.

▲ **O., Cuyahoga Heights**—SCHOOL ADDN.—Cuyahoga Heights Bd. Educ., 4820 E. 71st St., Cleveland, Zone 25, plans by Fulton, DelaMotte, Larson & Nassau, 6014 Euclid Ave., Cleveland, Zone 3, high school addn., **$1,250,000.** CD 11/14.

▲ **O., Dayton**—Dayton Metropolitan Housing Auth., Harries Bldg., plans by Paul Brown, John Head & Craighead Cowden, 39 Riverside Dr., 234 unit elderly citizens HOUSING, Dayton View East Dayton and on Summit St., **$3,800,000.** Bids in Winter. CD 3/8.

▲ **O., Kettering**—SCHOOL—Bd. Educ., Kettering, plans by Rial T. Parrish, Knott Bldg., Dayton, Indian Riffle Junior High School. **$1,400,000.** CD 11/14.

▲† **Pa., Phila.**—HOUSING—Dist. Pub. Wks. Office, 4th Naval Dist., Bldg. 1, Naval Base, plans by Bellante & Clauss, Suburban Station Bldg., Capehart Housing, 20th St. and Pattison Ave., **$6,000,000.** Bids about June 1961. CD 11/15.

Tenn., Chattanooga — Chattanooga Housing Authority, 1914 McCallis Ave., plans by Selmon T. Franklin, 142 N. Market St., (A) low rent HOUSING, East Chattanooga, 100 units; (B) low rent HOUSING, Proj., Alton Park area, 340 units, **$6,000,000.** Betts Engineering Co., 514 Lookout St., consult. engr. CD 1/16/53.

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Drag Line Excavators (drag lines): up through ¾"—6 x 19 Seale, Wisscolay, Double Gray-X, Lang Lay, IWRC

⅞" through 1⅝"—6 x 21 FW, Wisscolay, Double Gray-X, Lang Lay, IWRC
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▲ **Tenn., Elizabethtown** — PLANT — City, City Hall, furniture plant, $2,500,000, Lewisburg, Pa., Chair & Furniture Co., lessee.

▲ **Utah, Moab**—Grand County School Dist., plans by Ralph A. Edwards, 782 East 21 S., Salt Lake City, Utah, HIGH SCHOOL. $1,110,000.

▲ **Que., Baie Comeau**—Town, Town Hall, TOWN HALL, $1,000,000.

COMMERCIAL BUILDINGS

▲ **Calif. Anaheim**—HOTEL, etc.—Disneyland, 1313 S. Harbor Blvd., 10 story hotel exhibition and banquet hall, golf center. $6,000,000. Wheeler & Gray, 800 Colorado Ave., Pasadena, Calif., consult. engrs.

▲ **Calif., Milpitas**—SHOPPING CENTER, etc.—Lomac Development Co., c/o Robert B. Liles, archt., 340 Pine St., San Francisco, Calif., shopping center, office, bowling alley. $3,000,000. To go ahead summer 1961.

▲ **Calif., Palo Alto**—Stanford University, Palo Alto, plans by Campbell & Wong, 737 Beach St., San Francisco, Calif., married students HOUSING Escondido Village, Second Unit. $3,000,000.

▲ **Conn., Bridgeport** — APARTMENT — Sylflor Realty Corp., c/o Austin K. Wolf, 955 Main St., Bridgeport, 10 story, 233 units, apartment, Park Ave., $1,000,000.

▲ **Conn., Wethersfield** — APARTMENTS — Carlton, Inc., c/o William S. Ewing, Jr., 525 Main St., Hartford, plans by Irving W. Rutherford, 301 Farmington Ave., Hartford garden apartments, north of Jordan Lane, $2,000,000. Newman E. Argraves, 30 Park Row, Stamford, consult. engr. CD 12/14.

▲ **Fla., Miami**—RESIDENCES—Neil Schiff Constr. Corp., 1740 SW South River Dr., plans by William C. Kreidt, 127 NW South River Dr., 250 residences vicinity of Galloway Rd. and N. Kendall Drive, $3,750,000.

▲ **Fla., Miami Beach**—APARTMENT—Arthur Peisner & Robert Symonds, Beach Tower Hotel, 6061 Collins Ave., plans by B. Robert Swartburg, 4014 Chase Ave., 14 story apartment, swimming pool, cabanas, paving seawall. $2,500,000.

▲ **Fla., Winter Park**—MEN'S DORMITORY—Rollins College, Holt Ave., plans by James Gamble Rogers, Lovelock & Fritz, archts. & engrs., 145 Lincoln Ave., 4 story con. block men's dormitory, heating, air conditioning. $1,000,000. CD 1/3.

▲ **Hawaii, Honolulu**—OFFICE—The Hawaiian Dredging & Constr. Co., 1350 Ala Moana Blvd., 25 story office and 500 car parking on four levels. $17,000,000.

▲ **Mass., South Hadley**—Mountain View Corp., plans by John C. Parker, 359 Union St., Springfield, Mass., RESIDENTIAL DEVELOPMENT, Morgan St., South Hadley Center. $3,000,000. Durkee, White, Towne & Chapdelaine, Main St., Springfield, Mass., consult. engrs. Bids Mar. 1. 1961.

▲ **Mich., Mount Clemens**—HOSPITAL ADDN.—St. Joseph Hospital, North Ave., plans by Albert Kahn Associated Architects & Engineers, Inc., 345 New Center Bldg., Detroit, Zone 2, 4 story 100 bed St. Joseph Hospital addn., North Ave., $2,500,000. Bids about March 1961.

▲ **Minn., Minneapolis**—HOME FOR AGED—Plymouth Congregational Residence, c/o Armstrong & Schlichting, Inc., archt., 4901 Olson Memorial Hy., Home for the Aged, Ridgewood Rd. $1,000,000. Bids Spring 1962.

▲ **N. J., Darlington (Ramsey P.O.)**—PHILOSOPHY—Immaculate Conception Seminary, Valley Rd., Darlington (Ramsey P. O.), philosophy bldg. on campus. $4,000,000.

▲ **N. Y., Brooklyn**—SCHOOL—Diocese of Brooklyn, 191 Joralemon St., Zone 2, plans by Anthony J. De Pace, 151 W. 46 St., New York, Zone 19, Nazareth High School, Ditmas Ave. and Clarendon Rd., E. 57 and 58 Sts. $5,000,000. CD 1/22.

▲ **N. Y., Brooklyn**—Shapco Builders, Inc., 20 E. 46 St., New York, Zone 7, 14 story 180 x 240 ft. APARTMENT, Ocean Parkway between Ave. M and Ave. N. $3,000,000.

▲ **N. Y., New York**—Andros Realty Corp., c/o John Avlon, 99 Hudson St., New York 13, plans by Boak & Raad, 175 Fifth Ave., New York 10, N. Y., 19 story APARTMENT, east side 6 Ave. between 56 and 57 Sts. $3,500,000. CD 8/3/44.

▲ **N. Y., New York**—TV NETWORK PRODUCTION CENTER ADDN.—Columbia Broadcasting System, Inc., 485 Madison Ave., plans by Charles Luckman, 680 5 Ave., Zone 19, TV network production center addn., W. 57th, 10 and 11 Aves. $7,000,000.

▲ **N. Y., Rockaway**—APARTMENTS, etc.—Atlantic Improvement Corp., 52 Broadway, New York 6, N. Y., plans by Tippetts-Abbett-McCarthy-Stratton, archts.-engrs., 375 Park Ave., New York 22, N. Y., apartments, homes, schools, churches, parks, shopping centers, Breezy Point (8-10 Year Program). Cost reduced to $500,000,000. CD 3/17, under Northern Properties, as owner.

▲ **O., Gahanna**—HOMES—Virginia Homes, Inc., 655 N. Cassady Ave., Columbus, 185 Heritage Homes. $3,500,000. Constr. in Spring.

▲ **O., Independence**—Visconsi & Assocs., 6867 Pearl Rd. Cleveland, Zone 30, will not construct, SHOPPING CENTER, Rockside and Brecksville Rds., $2,000,000. Rudolph Orgler, 1900 Euclid Bldg., Cleveland 15, O., archt., project abandoned. CD 3/16.

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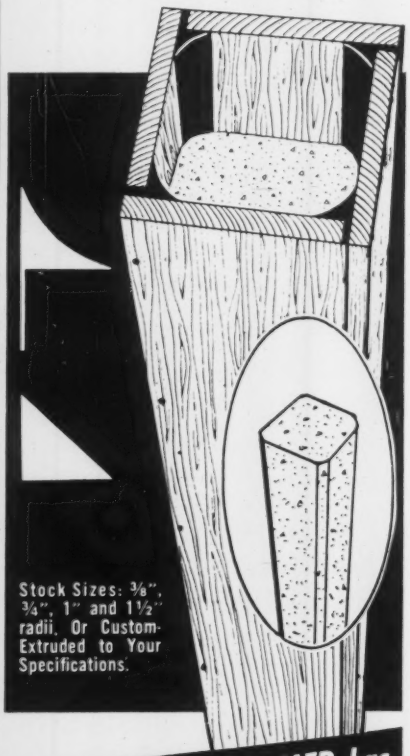

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- 1800 ft. main span • Side spans 555 ft. in length
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- Under clearance: 142 ft. at mid-span, 135 ft. at the towers
- Requires 60,000 tons of steel
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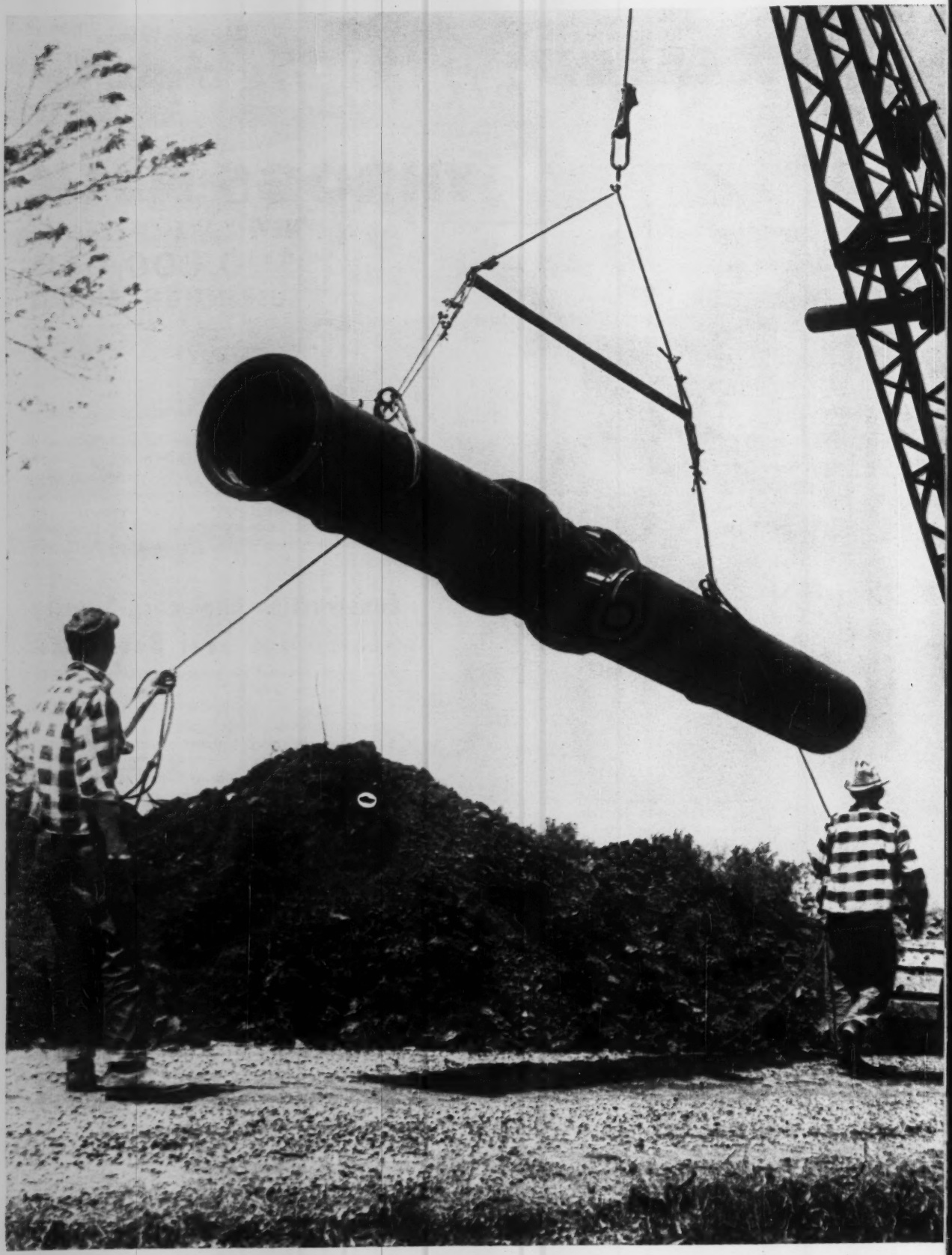

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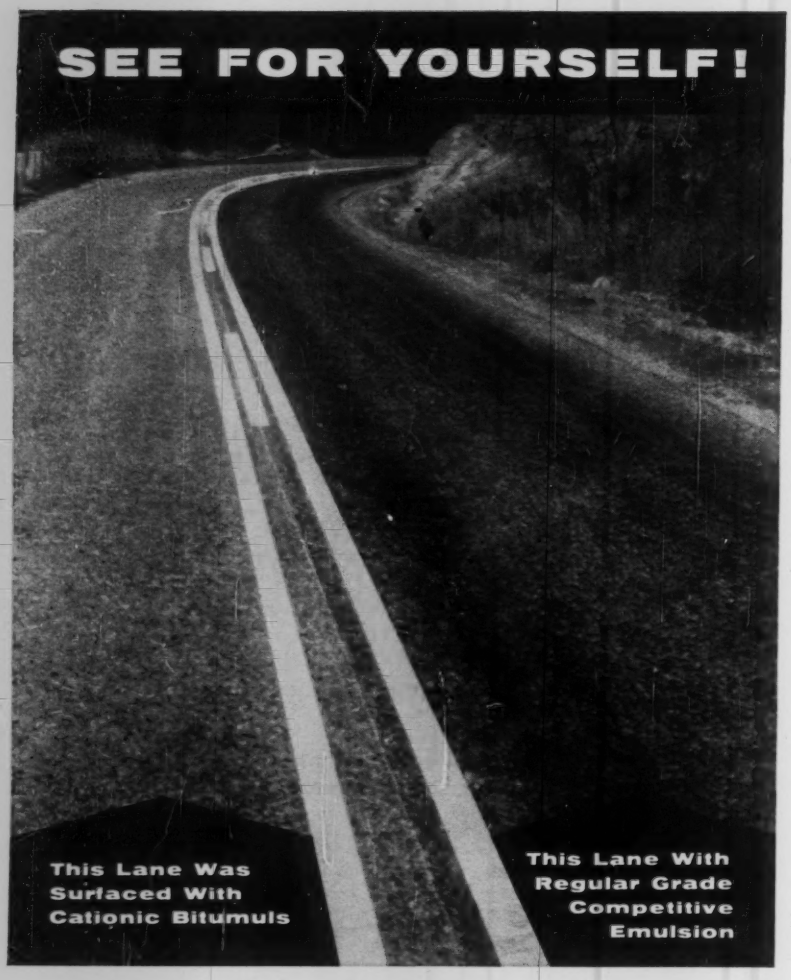

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▲ **O., Kettering**—RECORDS PROCESSING—Ohio Bell Telephone Co., 215 W. 2nd St., Dayton, 80,000 sq. ft. records processing bldg., Woodman Dr., south of Dorothy Lane. $2,000,000.

▲ **O., Sheffield Lake**—Owenr c/o Shifrin Investment Co. Marshall Bldg., Cleveland, Zone 13, 100-120 suite garden-type APARTMENT, $1-1,200,000; SHOPPING CENTER, $1,000,000.

▲ **Pa., Phila**—HOSPITAL EXPANSION—Woman's Hospital of Phila, Preston & Parish Sts., plans by The Ballinger Co., 1625 Race St., hospital expansion, includes 300 bed hospital, $6,000,000. Bids Dec. 1961.

▲ **S. D., Sioux Falls**—BANK—National Bank of South Dakota, Downtown 100 N. Phillips St., bank, between 8th and 9th Sts. Over $3,000,000. Bids in December 1961.

▲ **Tex., Fort Worth**—HOSPITAL—St. Joseph's Hospital, 1401 S. Main St., plans by Joseph R. Pelich, 1203 Trans American Life Bldg., 7 story, 200,000 sq. ft., fl., hospital addn., North & West Wings, $3,500,000. CD 9/26/57.

▲ **Wash., Spokane**—STUDENT HOUSING—Gonzaga University, E502 Boone St., Spokane, student housing, $1,533,550.

▲ **Alta., Calgary**—OFFICE and APARTMENT TOWER—George Marks & Sam Hanen, c/o A. Dale & Assocs., archts., 1025 16th Ave. N. W., 22 story office and apartment tower, southeast corner 6th and 7th Aves., $2,500,000.

▲ **B. C., Coquitlam**—HOUSING—Yorkshire Corp. Ltd., 900 W. Pender St., Vancouver, plans by A. H. Ashworth & Assocs. Ltd., archts.-consult. engrs, 1030 W. Georgia St., Vancouver, Mary Hill Housing project, 1,100 homes, sewers, drainage, roads, paving and water mains, $1,000,000.

▲ **Ont., London**—Sisters of St. Joseph, St. Josephs Hospital, Richmond St., and Grosvenor St., plans by Watt & Tillmann, 645 Richmond St., HOSPITAL addn., $3,000,000. C. C. Parker Assocs., Ltd., 572 Dundas St., consult. engrs. CD 1/11.

▲ **Ont., Niagara Falls**—TOWER—Canadian Global Centre c/o Mayor Franklin Miller, City Hall, 400 ft. tower, with observation area, overlooking Niagara Falls, exhibition quarters, hotel, theatre, $25,000,000 to $30,000,000. W. Sefton & Assocs., Ltd., 234 Eglinton Ave. E., Toronto, consult. engrs.

▲ **Ont., Toronto**—Promenade Swiss Corp., Ltd., 670 Bayview Ave., plans by K. R. Cooper, 59 Mobile Dr. 16 story OFFICE, steel beams, long span steel joists, poured concrete, steel spans, PARKING DECK over bus depot, Yonge St., south of Eglinton Ave. W., $6,000,000. W. Sefton & Assocs., Ltd., 234 Eglinton Ave. E., consult. engr. CD 12/6, under Industrial Buildings.

▲ **Ont., Toronto**—COMMERCIAL—Furniture World, c/o William Shulman, archt., 99 Avenue Rd., 8 story commercial bldg., Hy. No. 27 and Rathburn Rd. $8,000,000.

INDUSTRIAL BUILDINGS

▲ **Ariz., Tucson**—EXTRACTION PLANT—Kerr-McGee Oil Industries, Inc., Kerr-McGee Bldg., Oklahoma City, Okla., 2½ mil. cu. ft. gas daily capacity helium extraction plant, near here. $1,500,000.

▲ **Ill., Kankakee**—PLANT—Armour & Co., 401 N. Wabash Ave., Chicago, 1 story, 150 x 250 ft. processing plant, 250 x 350 ft. packaging and finished product storage bldg., 55 x 75 ft. office, ten storage tanks, Hy. 54, $6,500,000. Bids early 1961.

▲ **Ill., Olney**—PLANT, etc.—Owner c/o Lester B. Knight & Assocs., archts-engrs., 549 Randolph Ave., Chicago, 225,000 sq. ft. plant to mfg. juvenile wheel goods, 175,000 sq. ft. warehouse and 20,000 sq. ft. office $5,000,000. Wheel Goods Div. American Machine & Foundry Co., 261 Madison Ave., New York 16, N. Y., lessee.

▲ **N. J., Vineland**—Kimble Glass Co., 40,000 sq. ft. GLASS PLANT; 100,000 sq. ft. warehouse. Over $1,000,000. Bids Spring 1961.

▲ **O., Cleveland**—Union Carbide Corp., 1300 Lakeside Ave., Zone 14, 6 story PLANT addn., $1,000,000. Osborn Engineering Co., 7016 Euclid Ave., Cleveland 3, O., consult. engr.

▲ **O., Cuyahoga Falls**—BAKERY—Lawson Milk Co., 210 E. Broadway, plans by Trefon Sagadencky, 427 Chestnut St., bakery expansion, $1,300,000.

▲ **Pa., Phila**—PUBLISHING PLANT—Curtis Publishing Co., Independence Square, Phila, publishing plant addn. $15,000,000. Bids for first stage Spring 1961.

▲ **Pa., Quakertown**—Quakertown Industrial Park Corp., 314 W. Broad St., plans by Ballinger Co., 1625 Race St., Phila., INDUSTRIAL PARK, $2,000,000. Bids during 1961.

▲ **Tex., Baytown**—PLANTS, etc.—Humble Oil & Refining Co., 1216 Main St., Houston, benzene plant enlargement, $3,000,000; toluene plant enlargement, $2,750,000; desulphurization plant addn., $2,000,000; high pressure hydrogen line, $200,000; for 1961 tanker lines, $175,000; barge lines, $190,000. CD 8/28/58.

▲ **Tex., Houston**—PLANT—Petro-Tex Chemical Corp., (Food Machinery & Chemical Corp., and Tennessee Gas Trans. Co.) La Porte Rd., Tetrahydrophthalic anhydride Production Plant, 8600 Park Place Blvd., approx $22,000,000. Scientific Design Co., Inc., 2 Park Ave., New York, N. Y., consult. engr. CD 6/21.

Bids—Low Bids—Contracts—Second Section

NEW ENGLAND

HEAVY CONSTRUCTION—BA

Conn., Southington—BA 2/3—Town, Bd. Sewer Comrs., Town Hall, 10,580 ft. 15, 10 and 16 in. vitrified clay and cast iron pipe, manholes, West St. Sanitary SEWER SYSTEM, $225,000. Plans deposit $25. CD 11/29.

† **Me., Brunswick**—BA 2/23—Dist. P. Wks. Office, 1st Naval Dist., 495 Summer St., Boston 10, Mass., repair PARKING LOTS, Bldgs. 15 and 16 and replace Old Gurnet and Merriconeag Rds., U. S. Naval Air Station, NBy 3439, Spec. 34390/60. $25,000-$100,000. Plans deposit $55. CD 9/8/58.

† **Mass., Boston**—BA 2/24—Dist. P. Wks. Office, 1st Naval Dist., 495 Summer St., Boston 10, Mass., STEAM DISTRIBUTION sys. Bldg. 106, Pier 11, North Boston Naval Shipyard, NBy 34469, Spec. No. 34469/60. $25,000-$100,000. Plans deposit $25. CD 9/28/59.

HEAVY CONSTRUCTION—LB & CA

Morrison & Cubelli Constr. Co., 144 Island Brook Ave., Bridgeport, Conn., LB **$240,085**, (7 bidders), Contr. 49, SEWERS, 2.5 mi. Tunxis Hill Area. Tunxis Hill Rd. Vesper St., Pope St., Chapman Ave., Ridgely Ave., Pickwick St., etc., FAIRFIELD, CONN., Town, Town Hall, Fairfield, Conn. CD 4/29.

Coley-Wood Developing Co., Weston, Conn., LB **$180,960**, (4 bidders), GRADING, drainage, Seaview Park, SOUTH NORWALK, CONN., City, City Hall, Norwalk, Conn. Bids Jan. 10. CD 11/30.

BUILDINGS—LB & CA

Conti & Donahue Inc., 239 Commercial St., Lynn, Mass., LB **$729,521** est. $700,000, Y.M.C.A. addn., Foster and Main Sts., MELROSE, MASS. Young Mens Christian Assn, 497 Main St., Melrose, Mass. Bids Jan. 13. CD 1/4.

▲ **Gelco Builders & Brujay Constr. Co.**, 513 E. 119 St., New York, N. Y., LB **$1,324,848**, Western Junior High SCHOOL, Post Road, Byram, GREENWICH, CONN., Town, Dpt. Pub. Wks., Town Hall, Greenwich, Conn., Bids Jan. 5. CD 12/5.

Douglas E. Dahm Co., Middle Rd., Farmington, Conn., CA **$959,783**, Junior High SCHOOL, Fishtown Rd., North Central Area, GROTON, CONN., Town, Bd. Educ., Poquonnick Bridge, Conn. Bids Dec. 28. Awarded Jan. 12. CD 1/11, under LB.

MIDDLE ATLANTIC

HEAVY CONSTRUCTION—BA

† **New York**—BA 2/8—U. S. Eng., 111 E. 16 St., New York 3, REMOVAL and disposal 42,800 cu. yd. material except ledge rock lying above plane 16 ft. below mean low water, English Kills Reach, Newtown Creek, Kings Co. CIVENG-30-076-61-25. $75,000. Plans deposit $1.50.

N. Y., New York—BA 2/9—New York City Housing Auth., Rm. 312, 299 Broadway, New York 7, STREET and YARD imprvts., William McKinley Houses, Proj. NYS-31 and Martin Van Buren Houses, Proj. NYC-30, E. 161 St. Tinton Ave., E. 163 St. and Trinity Ave., Bronx Boro. Plans deposit $25.

N. J., Elizabeth—BA 2/16—Office ch. engr., Port of New York Auth., Rm. 1100, 111 8 Ave., New York 11, N. Y., Contr. EP-110.007, terminal STREET extension, Phase 1, Elizabeth-Port Authority Piers. Plans deposit $30. CD 2/22/59.

N. J., Teterboro—BA 2/16—Office ch. engr., Port of New York Auth., Rm. 1100, 111 8 Ave., New York 11, N. Y., Contr. TA-290.001, POLICE TRAINING facility, Teterboro Airport. Plans deposit $30.

New York and New Jersey—BA 2/16—Office ch. engr., Port of New York Auth., Rm. 1100, 111 8th Ave., New York 11, N. Y., Contr. GWB-190.032 George Washington BRIDGE, lower level expansion, New Jersey approach, toll booths and canopies. Plans deposit $30. CD 12/14, under LB.

† **N. Y., Westhampton Beach**—BA 2/16—U. S. Eng., 111 E. 16 St., New York 3, ARMAMENT and ELECTRONICS SHOP, Suffolk County Air Force Base. ENG-30-076-61-85. $300,000. Plans deposit $10. CD 8/1.

† **N. Y., Watervliet**—BA 2/16—U. S. Eng., 111 E. 16 St., New York 3, rehabilitation COMMUNICATIONS sys., Watervliet Arsenal. ENG-30-075-61-79. $200,000. Plans deposit $10.

BUILDINGS—LB & CA

▲ **Terminal Constr. Corp.**, State Hy. 17, Wood-Ridge, N. J., LB **$8,107,000** (7 bidders), general contract, concrete design Borgia Butler HOUSES, Proj. No. NYS-84, Section 1, Bldg. No. 1, community center No. 3, boiler room; No. 4, No. 6, children's center and toy storage shelter, E. 171 St., Webster Ave., E. 169 St., Bronx Boro, NEW YORK, N. Y. New York City Housing Auth., 299 Broadway, New York 7, N. Y. Bids Jan. 17. CD 1/10.

S. S. Silberblatt, Inc., 25 W. 45 St., New York 19, N. Y., LB **$8,844,500** (7 bidders), general contract steel design Borgia Butler Houses, Proj. No. NYS-84, Bronx Boro (New York, N. Y.).

Afgo Engineering Corp., 475 Adelphi St., Brooklyn 17, N. Y., LB **$842,784** (4 bidders), heating and ventilating, Borgia Butler Houses, Proj. No. NYS-84, Bronx Boro (New York, N. Y.).

Herman H. Schwartz, Inc., 97-11 Sutphin Blvd., Jamaica, N. Y., LB **$717,470** (9 bidders), electrical work, Borgia Butler Houses, Proj. NYS-84 Bronx Boro (New York, N. Y.).

Far Plumbing Co., 2018 Croton Parkway, New York 60, N. Y., LB **$1,115,000** (8 bidders), plumbing, Borgia Butler Houses, Proj. NYS-84, Bronx Boro (New York, N. Y.).

Otis Elevator, 260 11 Ave., New York 1, N. Y., LB **$529,881** (4 bidders), elevators, Borgia Butler Houses, Proj. NYS-84, Bronx Boro (New York, N. Y.).

▲ **Walsh Constr. Co.**, 711 3 Ave., New York 17, N. Y., CA Total Cost **$13,000,000**, SUPERSTRUCTURE for 21 story Telephone Exchange and Office, 789-813 Tenth Ave., NEW YORK, N. Y. New York Telephone Co., 140 West St., New York 7, N. Y. Bids Dec. 16, awarded Jan. 16. CD 11/29.

J. C. Orr & Sons, 438 7th Ave., Altoona, Pa., LB **$609,034** (13 bidders), HIGH SCHOOL ADDN., Kishacoquillas Joint School Dist., REEDSVILLE, PA. Pa. Pub. Sch. Bldg. Authority, 101 S. 25th St., Harrisburg, Pa. Hunter, Campbell & Rea, 3601 5th Ave., Altoona, Pa., archts. Bids Jan. 12. CD 12/8.

Baltimore Contractors, Inc., 7115 Central Ave., Baltimore 2, Md., LB **$571,000** (10 bidders), masonry, steel LABORATORY SCHOOL, Coppin State Teachers College, BALTIMORE, MD. State, Dpt. P. Imprvts., 301 W. Preston St., Baltimore 1, Md. Tyler, Ketchum & Myers, 1020 St. Paul, Baltimore, Md., archts. CD 12/5/50.

SOUTH

HEAVY CONSTRUCTION—BA

KENTUCKY—BA 2/3—Commonwealth Ky., Dpt. Hys., Frankfort, BRIDGE,

Floyd Co.—bridge and approaches 0.212 mi. over Levisa Fork, Big Sandy River near Auxier, S 751(1) SP 36-696.

KENTUCKY—BA 2/3—Commonwealth Ky., Dpt. Hys., Frankfort, ROADS,

Campbell Co.—c. conc. pavt. 2.169 mi. Grand Ave., Newport and Fort Thomas, Caruthers Rd. extending southeasterly to Fort Thomas Ave. and Bivouac Pl. US 19(5), SP 19-871.

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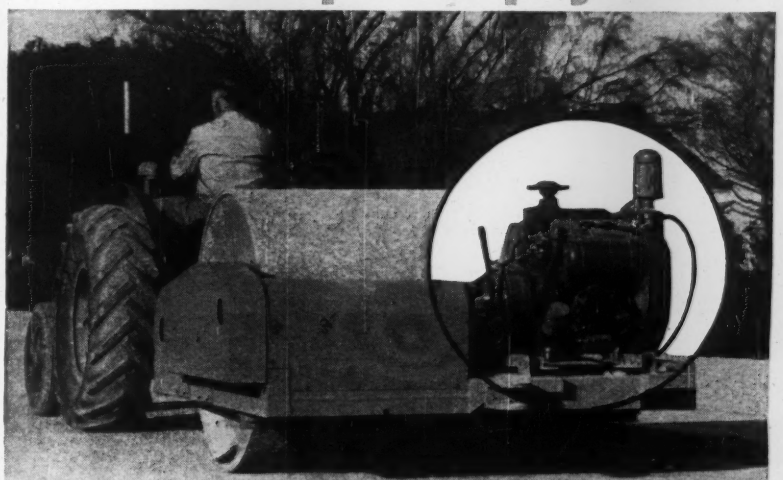

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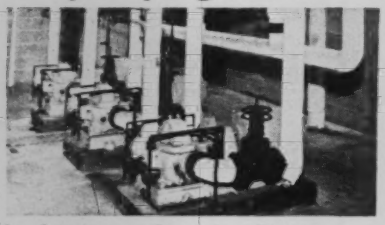
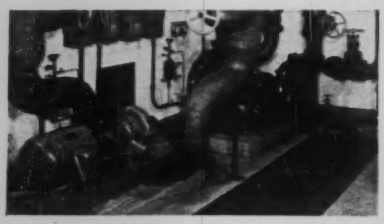


In Luzerne County, Penn.

. . . the new, state-operated institution for defective delinquents depends on three Weinman Type JC Multi-stage, Split Case Pumps to circulate water to its 30-building complex scattered over 1250 acres. Operating from a central plant, the Weinman Pumps deliver a 'round-the-clock supply of water for heating and domestic use to each building.



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Scott Co.—grade, drain 3.049 mi. Covington-Lexington-Tennessee State Line Rd. from 0.7 mi. north Porter Rd. northerly to Ky. 608, I 75-6(7)135, SP 105-554.

† **Va., Langley Field**—BA 2/3—National Aeronautics and Space Admin., Bldg. 1195, Langley Field, PIPELINE and motorized valve operators, Bldg. 1247. $10,000.

† **Ala., Huntsville**—BA 2/7—U. S. Eng., P.O. Box 1169, Mobile, WATER RESERVOIR and utilities, Redstone Arsenal, ENG-01-076-61-47. $200,000. Extended date. CD 1/3.

† **Fla., Tampa**—BA 2/8—Base Procurement Office, Box 6055, MacDill Air Force Base, SEWER LINE modification Bldg. 1105, MacDill Air Force Base, IFB-08-602-61-17. Under $25,000. CD 9/29/59.

† **Fla., Tampa**—BA 2/8—Base Procurement Office, Box 6055, MacDill Air Force Base, SENTRY HOUSE, MacDill Air Force Base, IFB-08-602-61-18. $25,000. CD 9/29/59.

† **Florida**—BA 2/9—U. S. Eng., P.O. Box 4970, Jacksonville, REHABILITATION Jetties, Jacksonville, Harbor. ENG-08-123-61-44. $100,000. CD 1/16.

† **Ga., Brunswick**—BA 2/16—Pub. Wks. Office, U. S. Naval Base, Charleston, S. C., CLEARING, grading and grassing ditches, U. S. Naval Air Station, Glynco, NBy 34609. Under $10,000.

BUILDINGS—BA

▲ **Va., Richmond**—BA 2/28—Medical College of Virginia, 523 N. 12th, MEDICAL EDUCATION FACILITY, $5,500,000. Plans deposit $75. Merrill C. Lee, 601 E. Franklin, Richmond, Va., archt. Wiley & Wilson, Lynchburg, Va.; Wm. T. St. Clair, 601 E. Franklin, Richmond, Va., engrs. CD 6/20.

HEAVY CONSTRUCTION—LB & CA

† **Mike Hooks, Inc.**, Box 135, Lake Charles, La., LB $700,931 est. $2,000,000, (5 bidders), DREDGING 8,491,000 cu. yd. Mississippi River-Gulf Outlet from Sta 1809 plus 80 to Sta. 2049 plus 40 St. Bernard Parish, CIVENG-16-047-61-88, LOUISIANA. U. S. Eng., foot of Prytania St., New Orleans, La. Bids Jan. 10. CD 12/15.

BUILDINGS—LB & CA

▲ **Hercules Powder Co.**, Delaware Trust Bldg., Wilmington 99, Del., Own Forces, POLYOLEFINS PLANT, LAKE CHARLES, LA.

▲ **Al J. Schneider Constr. Co.**, 3720 7 St. Rd., Louisville, Ky., LB $2,727,000, (5 bidders), Atherton HIGH SCHOOL, LOUISVILLE, KY. Bd. Educ., 5 and Hill Sts., Louisville, Ky. Bids Jan. 17. CD 1/5.

MIDDLE WEST

BUILDINGS—BA

† **Wis., Beloit**—BA 2/21—U. S. Eng., 536 S. Clark St., Chicago, Ill. Army RESERVE CENTER and maintenance shop. ENG-11-032-61-62. $150,000. Plans deposit $10. Bids Nov. 10 rejected. CD 11/25, under LB.

† **Wis., Eau Claire**—BA 2/21—U. S. Eng., 536 S. Clark St., Chicago, Ill. Army RESERVE CENTER and maintenance shop. ENG-11-032-61-62. $30,000. Plans deposit $4. Bids Nov. 10 rejected. LB $183,000. CD 11/25, under LB.

HEAVY CONSTRUCTION—LB & CA

Pinckney P. Brewer & Sons Co., 7374 Main St., Cincinnati, O., LB $120,722, WATER LINE 1580, Kemper, School and Conrey Rds., CINCINNATI, O. Hamilton Co. Bd. Comrs., Cincinnati, O. CD 10/13.

Edward J. Buck, 306 Defiance, Findlay, O., CA $125,293, (6 bidders), CLEANING PACKER CREEK, PORT CLINTON, O. Ottawa County Comrs., Court House, Port Clinton, O. Bids Jan. 11, awarded Jan. 11. CD 12/22.

BUILDINGS—LB & CA

O. Dpt. P. Wks., State Dpts. Bldg., Columbia, Zone 15, O., rejected bids Dec. 6, first unit West Green DORMITORY, Ohio University, ATHENS, O. Potter, Tyler, Martin & Roth, 128 E. 6th St., Cincinnati, O., archts. Ziel-Blossom & Assocs., 128 E. 6th St., Cincinnati, engrs. New bids Jan. 20. (Correction—status). CD 12/15, under CA.

Black & Combs Constr. Co., 1522 Delynn Dr., Dayton, O., Owner Builds, $625,000, 25 HOMES, Terrace Park, west edge of Centerville, DAYTON, O.

Frank Messer & Sons, Inc., Paddock Rd., Cincinnati, O., LB $693,300, DORMITORY No. 6, Miami University, OXFORD, O., (3 bidders), State of Ohio, and Miami University, Oxford, O. Cellarius & Hilmer, 4th and Main Sts., Cincinnati, O., archts. Bids Jan. 12. CD 12/14.

▲ **H. G. Christman Constr. Co.**, 850 S. Fellows St., South Bend, Zone 24, Ind., CA $1,459,266, est. $3,000,000, Senior HIGH SCHOOL, LA PORTE, IND. La Porte Community Schools, 910 Harrison St., La Porte, Ind. Bids Dec. 15, awarded Jan. 2. CD 1/5, under LB.

▲ **Geo. A. Fuller Co.**, 111 W. Washington St., Chicago, Zone 2, Ill., CA Est. $2,000,000, EXHIBITION HALL, 741 S. Wabash Ave., Chicago, Ill. Holabird & Root, 180 N. Wabash Ave., Chicago, Zone 1, Ill. Bids Nov. 30. CD 11/28.

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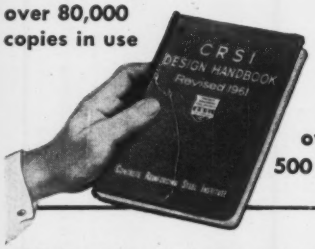

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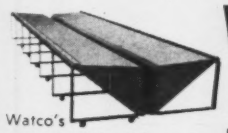

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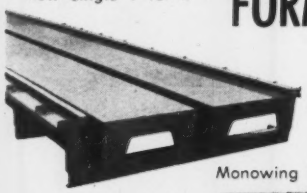

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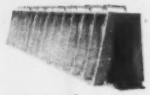

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Mayfair Constr. Co., 5660 N. Jersey St., Chicago, Ill., LB $969,900, est. $750,000, rapid TRANSIT INSPECTION SHOP and service bldg., rein.-con. floors, steel frame, 80 x 300 ft., Forest Park, CHICAGO, ILL. Chicago Transit Authority, Merchandise Mart, Chicago, Zone 54, Ill. Skadberg Olson Co., 2532 N. Milwaukee Ave., Chicago, Ill., archts. Bids Jan. 12. CD 1/3.

▲† Electronics and Missile Facilities, Inc., 2 Lafayette St., New York, N. Y., CA $2,500,000, remodeling FAMILY HOUSING, Scott Air Force Base, SCOTT AIR FORCE BASE, ILL. Base Procurement Officer, Scott Air Force Base, Ill. CD 9/9/59.

MISSISSIPPI TO ROCKIES

HEAVY CONSTRUCTION—BA

Tex., Palestine—BA 2/6—Dpt. P. Wks., City Hall, laying 62,300 lin. ft. 10 in. vit. clay SANITARY SEWERS. $245,000. Plans deposit $25. Forrest & Cotton, 600 Vaughn Bldg., Dallas, engrs. CD 7/20/55.

Minn., Brainerd—BA 2/6—Crow Wing Co., Court House, GRAVEL base and road-mixed bit. base 5.1 mi. between CSAH 8 at Pine Center and east county line, CSAH 2.

▲† Mont., Great Falls — BA 2/7 — Ballistic Missile Constr. Office, U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., MINUTEMAN MISSILE COMPLEX, Malmstrom Air Force Base, ENG-04-548-61-1, Great Falls, Mont. CD 1/3, under LB.

Minn., Two Harbors—BA 2/8—Lake Co., County Aud., Court House, GRADING, sand-gravel subbase, gravel base, road-mixed bit. base and bit. seal coat 0.6 mi. between TH 1 in Finland and point 0.6 mi. east TH 1 and bridge No. 38501, 43 ft. long, 28 ft. roadway to carry CSAH 6 over east branch of Baptism River, CSAH 6.

† N. M., Sacramento Peak—BA About 2/21—U. S. Eng., 2132 Central Ave. S.E., Albuquerque, electrical emergency POWER PLANT, Sacramento Peak, Otero Co., ENG-29-005-61-55. $25,000. CD 9/29/59.

† Wyoming—BA 2/28—Bureau Reclamation, Dpt. Interior, Casper, Wyo., two RESIDENCES for government camp, Seminoe Dam, Kendrick Proj. near Sinclair, Carbon Co., Spec. DC 5487. CD 11/1, under LB.

BUILDINGS—BA

† New Mexico—BA 2/14—U. S. Eng., Box 1538, Albuquerque, G.M. Maintenance SHOP and motor repair shop, ENG-29-005-61-46. $300,000. Plans deposit $10. CD 1/5.

† N. M., Albuquerque—BA 2/15—U. S. Eng., P.O. Box 1538, Albuquerque, EVAPORATIVE COOLING BLDG. No. 221, Sandia Base, Bernalillo Co., ENG-29-005-61-31. CD 10/21, under LB.

HEAVY CONSTRUCTION—LB & CA

Yegge Blosser Constr. Co., 703 8 St., Boone, Iowa, CA $193,109 Miles St. BRIDGE and approaches, WATERLOO, IOWA. City, City Hall, Waterloo, Iowa. Awarded Dec. 27.

† Ashbach Constr. Co., 1910 County Rd. C, St. Paul Minn., LB $249,850, est. $308,760, (12 bidders), FLOOR PAVING, West Cave, Lake City Arsenal, Atchison Ordnance Storage Facility. ENG-23-028-61-54, ATCHISON, KAN. U. S. Eng., 1800 Federal Office Bldg., Kansas City 6, Mo. Bids Jan. 12. (Correction—contractors' address). CD 1/18.

Swisher Company Electric Cooperative, 222 W. Broadway, Tulia, Tex., Owner Builds, $98,000, TIE-LINES, Tulia, Swisher Co., TEXAS. CD 1/9/59.

P. Wks. Dpt., City Hall, Brownsville, Tex., Owner Builds, $95,500, SANITARY SEWERS, BROWNSVILLE, TEX. CD 11/23.

Dpt. P. Wks., City Hall, El Paso, Tex., Owner Builds, $92,000, 9 hole GOLF COURSE and sprinkling systems, EL PASO, TEX. CD 11/18.

Cage Brothers Constr. Co., 6959 San Pedro Ave., San Antonio, CA $562,840, SEWAGE TREATMENT PLANT ENLARGEMENT, SAN ANTONIO, TEX. City, Dpt. P. Wks., City Hall, San Antonio, Tex. Irving S. Seligmann, 417 Dwyer Ave., San Antonio, engr. CD 1/17.

City of South Houston, City Hall, South Houston, Tex., Owner Builds, $100,000, STREET SURFACING & imprvts., SOUTH HOUSTON, TEX. CD 3/1.

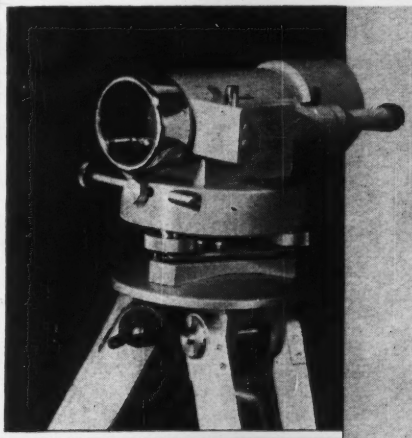
City of Waco, City Hall, Waco, Tex., Owner Builds, $92,000, SEWERAGE COLLECTION LINES, WACO, TEX. Forrest & Cotton, 600 Vaughn Bldg., Dallas, Tex., engrs. CD 12/18/57.

Hidalgo Co. Road Dist. No. 2, Weslaco, Tex., Owner Builds, $150,000, surfacing and improving ROADS, WESLACO, TEX. Forrest & Cotton, 600 Vaughn Bldg., Dallas, Tex., engrs. CD 8/17.

BUILDINGS—LB & CA

W. A. Klinger, Inc., 2015 7th St., Sioux Falls, Iowa, LB $205,823, PHYSIOLOGICAL INSTRUMENTATION RESEARCH LABORATORY, AMES, IOWA. Bd. Regents, Rm. 107, Beardshear Hall, Iowa State University, Ames, Iowa. Bids Dec. 1. CD 11/16.

▲ Bank Bldg. & Equipment Corp. of America, 1120 Hampton Ave., St. Louis 10, Mo. CA Est. $1,000,000, design and construct BANK remodeling, Grand and Lindell Blvd., ST. LOUIS, MO. Mercantile National Bank, 3612 Washington Blvd., St. Louis 8, Mo.



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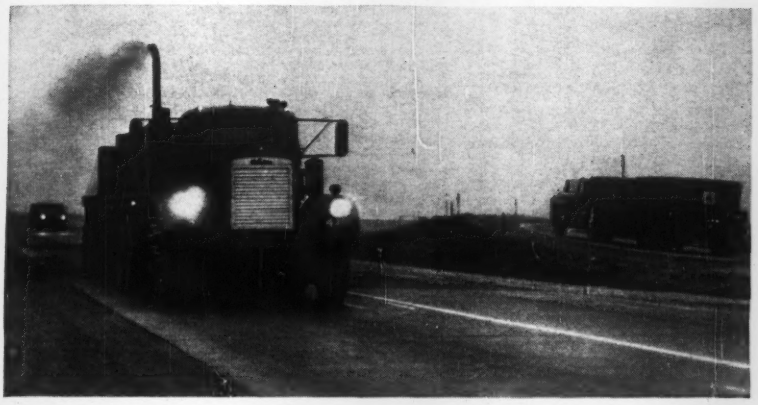

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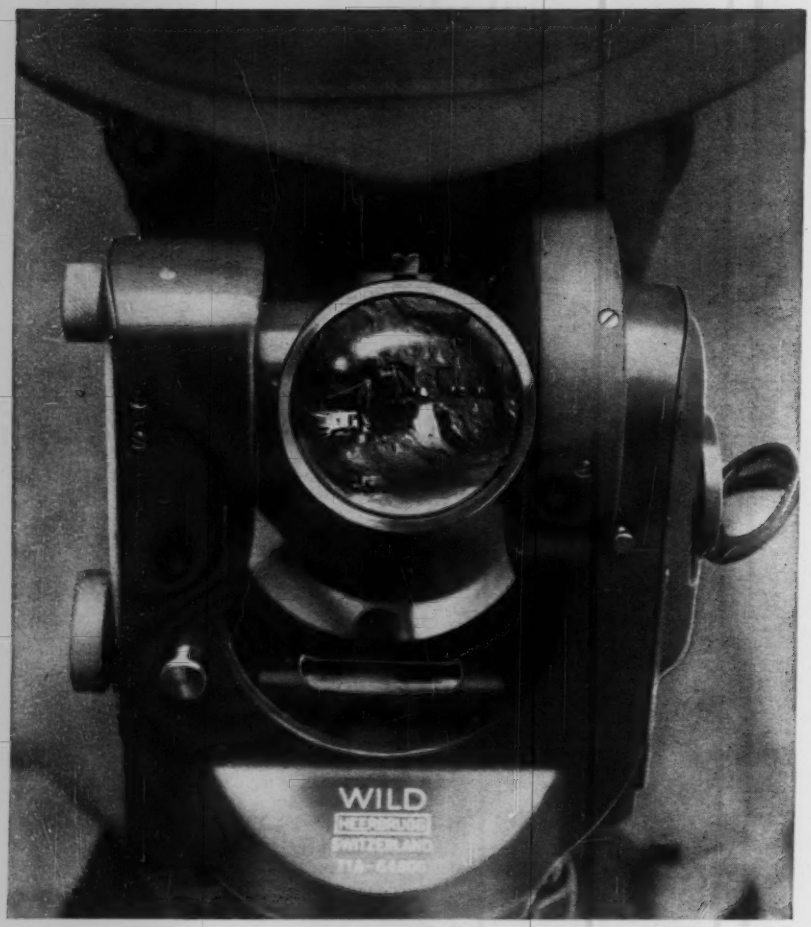

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In Canada: Wild of Canada Ltd., 157 Maclaren St., Ottawa, Ontario

Candoo Constr. Co., 7311 Almeda St., Houston, Tex., CA **$418,000**, PLANT UNIT, HOUSTON, TEX. Production Tooling Co., 6502 Rusk St., Houston, Tex. CD 10/7/59.

Spaw-Glass, Inc., Box 25025, Houston, Zone 5, Tex., CA **$342,500**, 5 story, masonry, PARKING GARAGE, HOUSTON, TEX. Allright, Inc., c/o Mullen & Powell, 601 Reliance Insurance Life Bldg., Houston,, Tex., engrs.

Burke Homes, 1100 Goliad Rd., San Antonio, Tex., Owner Builds, **$438,000**, 33 DWELLINGS, East Highland Hills, SAN ANTONIO, TEX.

FAR WEST

HEAVY CONSTRUCTION—BA

Washington — BA. 2/10 — Chelan Co., PUD, 327 N. Wenatchee, Wash., Rocky Reach-Columbia No. 2, wood-pole 230 kv. TRANSMISSION LINE, Rocky Reach Hydro-Electric project, Wenatchee. Plans deposit $25. CD 2/2/55.

CALIFORNIA—BA 2/21—State Div. San Francisco Bay Toll Crossings, Terminal Bldg., San Francisco, BRIDGE, **San Francisco and Alameda Counties**—strengthening upper deck of West Bay section, San Francisco-Oakland Bay Bridge. $525,000. CD 3/18/58.

Calif., Los Angeles—BA 2/24—Los Angeles County Flood Control Dist., 2250 Alcazar St., Proj. 417, West Burbank STORM DRAIN, Burbank. $517,900. CD 11/10/58.

† **Arizona**—BA 2/28—Bureau Reclamtion, Dpt. Interior, Bldg. 1A, Denver Federal Center, Denver, two 161 kilovolt power CIRCUIT BREAKERS for Phoenix substation, Parker-Davis Project, Spec. DC 5485. CD 9/15.

BUILDINGS—BA

Wash., Everett—BA 2/6—School Dist. No. 2, Auditorium Bldg., 56 x 240 ft., 2 story, steel frame CLASSROOM, and 42 x 75 ft., frame swimming pool, Everett Junior College, $500,000. Plans deposit $35. Hall & Dykeman, Commerce Bldg., archts. CD 5/2.

Calif., Garden Grove—BA 2/15—Garden Grove School Dist., 11362 E. Stanford St., Jackson SCHOOL. $400,000. Kistner, Wright & Wright, 1125 W. 6 St., Los Angeles, Calif., archts. CD 10/13.

HEAVY CONSTRUCTION—LB & CA

ALASKA—State, Dpt. P. Wks., Box 1361, Juneau, Bids opened 1/11, ROAD,

Baker & Ford Co., Mason Bldg., Bellingham, Wash., LB **$403,255**, est. $448,657 (7 bidders), grading, drainage, paving 2.06 mi. streets and roads in Fairbanks Area, Proj. No. S-0624(3). CD 1/4.

Lord Bros., 9233 N. Calvert, Portland, Ore., LB **$160,355**, est. $150,000 (6 bidders), 2,600 ft. 12 and 16 in. concrete cylinder WATER supply line, JUNEAU, ALASKA. City, City Hall, Juneau, Alaska. Bids Jan. 11. CD 12/21.

▲ **ARIZONA** — State Hy. Dpt., 206 S. 17th Ave., Phoenix, ROADS,

Ariz.—**Tanner Bros. Contracting Co.**, P.O. Box 12217, Phoenix, Ariz., CA **$806,561**, est. $745,630 (5 bidders), grading, draining, select material, aggregate base, asphaltic conc. emulsified asphalt seal coat, Proj. F-039-1(4), U.S. Rte. 93, beginning about 1½ mi. northwest Kingman, extending northwesterly over U.S. Rte. 93, approx. 4.2 mi., Proj. NON F-008-2 (61)A on U.S. Rte. 66, Kingman, beginning about 0.3 mi. southwest of junction of State Rte. 93, U.S. Rte. 66, extending northeasterly over U.S. Rte. 66, approx. 0.5 mi., Kingman-Hoover Dam Hy., and Ashfork-Kingman Hy., Mohave Co.;

Ariz.—**Givens Construction Co.**, P.O. Box 12287, Phoenix, Ariz., CA **$176,345**, est. $195,843, (8 bidders), 11-span reinforced conc. continuous slab bridge with approaches, incl. grading, draining, select material, aggregate base, asphaltic conc., emulsified asphalt seal coat, Gila River crossing of State Rte. 87, approx. 14 mi. west, State Rte. 287 and 87, north Coolidge, Coolidge-Mesa Hy., Pinal Co. CD 12/16;

Ariz.—**L. M. White Contracting Co.**, P.O. Box 6008, Tucson, Ariz., CA **$384,232**, est. $382,122 (6 bidders), grading, draining, select material, aggregate base, asphaltic conc., asphaltic conc. finishing course and construction of bridge, 2.8 mi. southeast junction of U.S. 80-89 and State Rte. 287, extending northwesterly, partially over new alignment of U.S. 80-89, incl. approx. 1.2 mi. along Colton Ave., tin town of Florence, Tucson-Florence Hy., Pinal Co. Bids Jan. 6, awarded Jan. 10. Grand total $1,306,207. CD 12/22.

UTAH—State Rd. Comn., State Capitol Bldg., Salt Lake City, bids opened 1/10 ROADS,

Utah-Tiago Constr. Co., 3399 S. 2nd West, Salt Lake City 15, Utah LB **$786,062** Est. $700,000, (7 bidders), 7.57 mi. plant mixed bit. surf. US 40 from Heber to McGuire Canyon, Wasatch Co.;

Utah—**LeGrand Johnson**, 639 E. 1st South St., Logan, Utah LB **$328,529** Est. $330,000, (6 bidders), 4.608 mi. 2½ in. bit. road mix surf. and prestressed concrete bridge 182.34 on Utah No. 24 and 61, Cache Co. CD 12/19.

Riley Pleas, Inc., 422 19 Ave. N., Seattle, Wash., LB **$247,928**, (6 bidders), EXCAVATE FISH SPAWNING CHANNEL, 1,200 ft. long, upstream from Rocky Reach Dam, with misc. bldg., Rocky Reach hydro proj., Wenatchee, Chelan Co., WASHINGTON. Chelan Co. PUD, 327 N. Wenatchee Ave., Wenatchee, Wash. Stone & Webster Engr. Corp., Lloyd Bldg., Seattle, Zone 1, Wash., engr. Bids Jan. 13. CD 12/22.

▲† **Gibbons & Reed Co.**, P.O. Box 2429, Salt Lake City, Utah, CA **$2,410,542**, EARTHFILL LEWISTON DAM approx. 740 ft. long at crest and approx. height of 80 ft. spillway, river-outlet works incl. power plant and hatchery outlet works, etc., Trinity River Div., Central Valley Proj. near Lewiston, Spec. No. DC 5434, CALIFORNIA. Bureau Reclamation, Dpt. Interior, Lewiston, Calif. Bids Dec. 20, awarded Jan. 12. CD 12/22, under LB.

Ventura Pipeline Constr. Co., 899 N. Olive St., Ventura, Calif., LB **$583,073** (10 bidders), 21,231 ft. 33 in. WATER PIPE, Water Main Exten. No. 1, VENTURA, CALIF. Ventura River Municipal Water Dist., 1055 Ventura Ave., Oak View, Calif. Bids Jan. 11. CD 12/29.

BUILDINGS—LB & CA

Oltmans Constr. Co., Inc., 516 S. Monterey Pass Rd., Monterey Park, Calif., CA **$170,000**, COLD STORAGE addn., VERNON, CALIF. Oscar Mayer & Co., 3301 E. Vernon Ave., Vernon, Calif. Henschein-Everets & Crombie, 59 E. Van Burn St., Chicago, Ill. and Earl G. Boehm, 9905 La Docena Lane, Pico-Rivera, Calif., archts.

▲ **Barkhorn Assocs**, 2895 Kalalaua Ave., Honolulu, Hawaii, Owner Builds, Total Est. **$8,000,000**, 450 unit, steel frame, concrete The Colony Surf APARTMENT HOTEL, HONOLULU, HAWAII. Edwin L. Bauer, 1521 S. King St., Honolulu, Hawaii, archt. CD 4/1. **Barkhorn Ltd. and Nordic Constr.**, 2895 Kalakaua Ave., Honolulu, Hawaii, CA concrete work 450 unit Apartment Hotel (Honolulu, Wawaii). This CA $3,000,000

Wunschel and Small, 6247 Ross Ave., Carmichael, Calif., LB **$460,300**, (14 bidders), WATER transmission mains, 24 St., Florin Rd. to Fruitridge Rd., SACRAMENTO, CALIF. City Council, Rm. 203, City Hall, 9 and I Sts., Sacramento, Calif. Bids Jan. 12. CD 12/21;
Valley Engineering, Inc., P. O. Box 992, Fresno 14, Calif., LB **$121,927**, (13 bidders), WATER transmission mains, elevated Tank No. 4 Meadowview Rd. and Henrietta Dr. (Sacramento, Calif.).

▲ **Vlier Contr. Co.**, 905 So. Castlegate, Compton, Calif., LB **$134,666**, (8 bidders), rehab. asphalt PAVING, Marine Corps Air Facility, Spec. 34313, SANTA ANA, CALIF. 11th Naval Dist. P. Wks., 1220 Pacific Hy., San Diego 1, Calif. Bids Jan. 12. CD 12/29.

† **The Pacific Co., Engineers & Builders of Berkeley**, 801 Cedar St., Berkeley, Calif., CA **$492,800** Sched. A plus additive item to incl. SAC MISSILE FACILITY (Area 1) incl. modification existing hangar No. 829, concrete block walls, corrugated metal siding, etc. storage bldg., sprinkler sys., engine test cell bldg. etc. ENG-04-203-61-170, TRAVIS AIR FORCE BASE, CALIF. U. S. Eng., 180 New Montgomery St., San Francisco, Calif. Bids Dec. 29. CD 12/5.

† **Longley Constr. Co.**, P. O. Box 2104, Las Vegas, Nev., LB **$272,440** est. $225,800, (5 bidders), OFF-SITE UTILITIES, Capehart Housing Proj. Spec. 30249, TWENTYNINE PALMS, CALIF. 11th Naval Dist. P. Wks., 1220 Pacific Hy., San Diego 1, Calif. Bids Jan. 12. CD 12/20.

CANADA

HEAVY CONSTRUCTION—LB & CA

▲ **NEW BRUNSWICK**—New Brunswick Dpt. P. Wks., Parliament Bldgs., Fredericton, BRIDGE,
Modern Constr. Co. Ltd., Salisbury Rd., Moncton, N. B., CA **$1,177,067** prestressed concrete approach spans and concrete deck of main spans, Jemseg River Bridge, Contr. 2, Jemseg. Foundation of Canada Engineering Corp. Ltd., 1989 Sherbrooke St., W., Montreal, Que., engr. CD 11/11/43.

▲ **ONTARIO**—Dpt. Hys., Parliament Bldgs., Downsview, BRIDGE,
Niagara Structural Steel Ltd., Smith & Petrie Sts., St. Catharines, Ont., CA **$1,460,910** structural steel Homer High Level Bridge, west superstructure, Contr. 60-99. Awarded Jan. 12. CD 12/20, under LB.

BUILDINGS—LB & CA

Secant Constr Co., 4824 Cote des Neiges Rd., Montreal, Que., CA **$583,683**, (13 bidders), 204 x 184 ft. FIREMAN'S TRAINING SCHOOL, Notre Dame St. E., MONTREAL, QUE. City, City Hall, Montreal, Que. Bids Dec. 14, awarded Jan. 10. CD 12/22, under LB.

Metro Universal Development, c/o 531 83rd Ave., L'Abord a Plouffe, Que. Owner Builds. **$800,000**. 2 and 3 story APARTMENT, Dalmar Ave., POINTE CLAIRE, QUE. Emilian Bujolk, 6746 Molson St., Montreal, Que., archt.

LATIN AMERICA

BUILDINGS—LB & CA

▲ **Overseas Industrial Constr. Ltd.**, Zurich, Switzerland CA Chimbote STEEL MILL addn., PERU. Corporacion Peruana del Santa, Lima, Peru.

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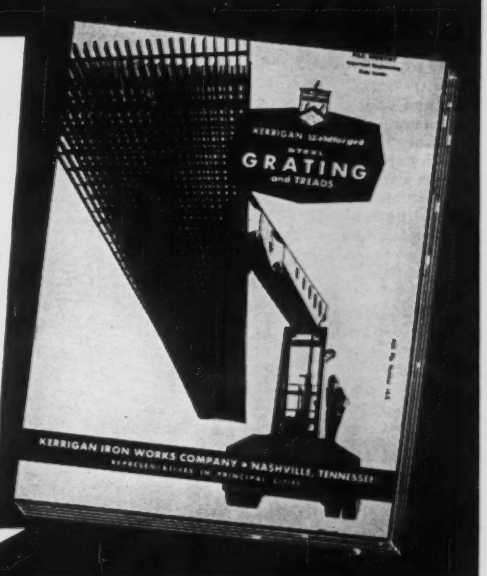
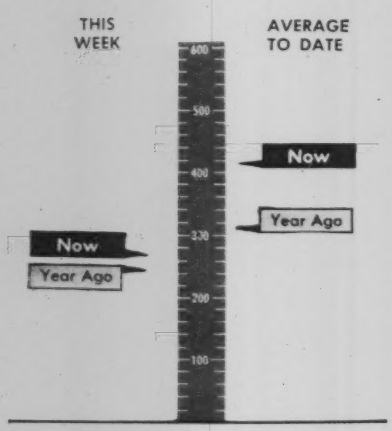


Dept. E-1 KERRIGAN IRON WORKS CO. Nashville, Tenn.
NAME _____
FIRM NAME _____
CITY _____ STATE _____

Construction Scoreboard

This Week...



AMOUNT OF CONTRACTS LET

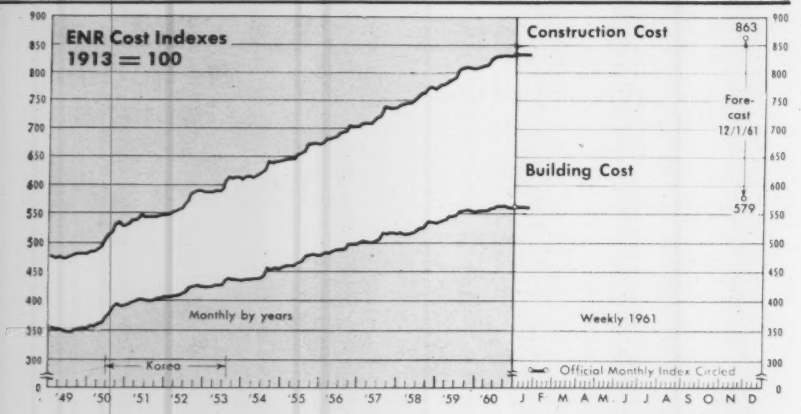
Contracts Awarded in 50 States By Type	This Week	Cum. 4 wks 1961	Chge '60-'61 %
	millions		
All Heavy Construction	$269.2	$1,660.6	+31
By Ownership			
PRIVATE	129.0	784.9	+17
PUBLIC	140.2	875.7	+47
State & Municipal	87.0	641.1	+53
Federal	53.2	234.6	+33
By Type of Work			
PUBLIC			
Waterworks	3.5	20.1	+1
Sewerage	6.3	36.6	−21
Bridges*	7.1	42.9	−4
Highways	35.2	349.5	+126
Earthwork, Dams & Waterways	14.6	54.1	−5
Buildings:			
Excl. Housing	38.7	251.7	+144
Housing	12.5	38.5	−25
Unclassified	22.3	82.4	−30
PRIVATE			
Buildings:			
Mass Housing	55.9	273.9	+6
Commercial	23.1	137.7	−21
Industrial	27.4	326.9	+68
Unclassified	22.6	46.3	+8

*Includes Private bridges

NOTE Minimum size projects included are: Waterworks and waterways, $53,000; other public works, $88,000; industrial buildings, $110,000; other buildings, $400,000.

NEW CONSTRUCTION CAPITAL

	Week of Jan. 19	Cum. 3 wks 1961	Chge '60-'61 %
	millions		
Corporate Securities	$29.7	$66.5	+25
State and Municipal:			
All Except Housing	137.7	250.5	−57
Housing	0.0	0.4	−33
Federal Loans	0.3	25.1	+1469
Federal Aid	0.0	0.0	0
Total Nonfederal	$167.6	$342.4	−47
Projects in U.S.	0.0	0.0	0
Outside U.S.	0.0	0.0	0
Total New Capital	$167.6	$342.4	−47



ENR INDEXES (1913 = 100), 20-cities' average	Week of Jan. 19 1961	% Change from Dec. 22 1960	% Change from Jan. 21 1960
Construction Cost	834.35	+0.5	+2.6
Building Cost	562.94	+0.3	+1.3

To convert above indexes to 1926 = 100: Divide Construction Cost by 2.080; Building Cost by 1.850.
1949 = 100: Divide Construction Cost by 4.770; Building Cost by 3.518.

Latest Month . . .

BACKLOG OF PROPOSED HEAVY CONSTRUCTION

	December 1960 (millions)	Percent Change from last Month	Year
Total U. S. (ENR reported)	$124,700	0.0	+5.4
By Ownership—			
Private	55,814	−0.2	+7.6
State & Municipal	54,293	+0.6	+4.5
Federal	14,593	−1.2	+0.6
By Type of Work—			
Waterworks	2,919	+0.5	+2.6
Sewerage	4,117	+0.2	+7.8
Bridges	3,284	−0.3	−4.5
Highways	13,634	+1.5	+5.2
Earthwork, Dams and Waterways	12,135	−0.3	+0.4
Public Buildings	22,724	+0.2	+6.5
Industrial Buildings	17,986	−0.4	+4.8
Commercial Buildings	27,274	−0.1	+13.7
Unclassified, Private	10,554*	−0.1	−1.4
Unclassified, Public	10,073	−0.9	+1.1

* Includes Private Bridges, $101 million

FLOW OF NEW PROJECTS INTO THE BACKLOG

	1960 Dec. (millions)	1960 12-months (millions)	Percent Change from 1959 Dec.	12-Mos.
Total U. S. (ENR reported)	$1,882	$22,656	+3.7	+7.2
By Ownership—				
Private	813	11,967	−28.3	+8.9
State & Municipal	1,005	8,517	+63.1	+12.5
Federal	64	2,172	0.0	−14.6
By Type of Work—				
Waterworks	39	396	+44.4	−25.9
Sewerage	62	797	−4.6	+2.3
Bridges	29	274	−29.2	−38.8
Highways	338	2,389	+225.0	+35.3
Earthwork, Dams and Waterways	15	640	−11.7	−24.7
Public Buildings	491	4,747	+48.8	+11.1
Industrial Buildings	225	3,340	−31.2	+3.1
Commercial: Mass Housing	222	4,779	−38.6	+23.4
Other Building	311	3,062	+24.4	+13.2
Unclassified, Private	55	785**	−71.6	−32.8
Unclassified, Public	95	1,447	−2.0	−1.0

** Includes Private Bridges, $15 million

FLOW OF PROJECTS OUT OF BACKLOG INTO CONTRACTS

Total U. S. (ENR reported)	$1,056	$11,496	+20.0	+11.0
By Ownership—				
Private	340	4,587	−16.8	+14.3
State & Municipal	479	5,126	+60.2	+17.1
Federal	237	1,783	+37.8	−9.5

Money Costs to Rise Moderately

The cost of borrowing for construction will rise this year, but chances are good that the post-war interest-rate record set in 1959 will not be broken.

In 1959, after hitting a peak of 3.98%, the composite of 20 long-term state and municipal bonds averaged 3.74% for the year, according to Moody's Investors Service. Last week, the average was 3.58%. The prime interest rate moved up to 5% in September 1959, remaining there until August 1960, when it dropped to 4½%. (The prime interest rate is the amount charged commercial banks' biggest and best customers. All other rates are scaled upward from it.)

During the first quarter of '61 interest rates probably will dip slightly—and temporarily—from the present levels in the public and private debt sectors. Any decline, however, will result more from uncertainty than from basic economic causes. Businessmen, more confused than optimistic or pessimistic, are to a large extent staying away from the capital market and banks.

This uncertainty, combined with greatly enlarged lending power resulting from technical changes made late last year by the Federal Reserve Board, is putting pressure on the commercial banks to reduce the prime rate from 4½%. But like their customers, the banks are inclined to withhold action until the Kennedy Administration reveals what methods it will use to stimulate the sluggish economy. Some economists and businessmen say the economy will recover without massive governmental action. President Kennedy's advisers lean to government action; but how much is up to the President.

Because the extent of federal action and borrowing is still uncertain, investors are marking time until the new Administration's course is more clearly plotted.

Although there is a large amount of money ready and available for investment, there is also a large volume of state and municipal bonds unsold on dealers' shelves, and more is expected to be offered within the next month or so.

As of last Monday, 32 state and local bonds listed for bidding within 30 days totaled $403 million, according to the DAILY BOND BUYER, a trade publication. Another $361 million worth remained unsold on dealers' shelves. So, from the investor's point of view, there is no need to hurry. He may have more to gain in the long run by waiting. A huge backlog of state and municipal bonds has been authorized—more than $3.2 billion worth in the November election alone. Although only a relatively small part of it will be moved to market this year, that amount will be on top of previous authorizations to be offered this year. These authorizations, plus the inclination of many state and local governments to ease unemployment by accelerating public works programs, will result in an increase of bond offerings sufficient to push volume this year above 1960's total of $6.6 billion (see table).

The increase in authorizations in itself will not appreciably raise the general rate structure. However, should the federal government, either as a recession prop or because of further declines in revenues, be forced into heavy deficit financing, rates could climb sharply.

Industry may not put too much pressure on the market this year, even though the anticipated pickup in business would ordinarily tend to send private borrowers into the money market. Businessmen can be expected to give the recovery a good test before boosting outlays much above those already planned.

Also, for the most part, funds for expansion and modernization will be obtained internally, from profits and depreciation allowances.

However, there is one possibility that could spur borrowing by industry: liberalization of tax treatment of corporate depreciation reserves. This could stimulate construction by industry of new capital facilities, thereby leading to increased demand for money.

Demand for mortgage loans can be expected to rise slightly, but the relatively modest increase—to 1.3 million housing starts generally anticipated this year—will not exert serious pressure on rates.

Interest rates on mortgage loans have dropped considerably in the last few months, and some further softening is expected in the near future. Savings in mutual savings banks and savings and loan associations are building at a pace that seems to assure a generous supply of mortgage funds.

Although rates in this sector may firm up late in the year, they won't approach the high rates and large discounts of last year.

Thus 1961 will be neither the best year nor the worst year for borrowing. Cheap money is not in the offing; neither is the expensive money of 1959. If construction is needed, the money will be available at firm, but reasonable rates.

Waiting for a better time may well prove to be a waste of time, and, in the long run, a waste of money also.

New Capital for Construction Tapers Off

Reported by ENR in millions of dollars

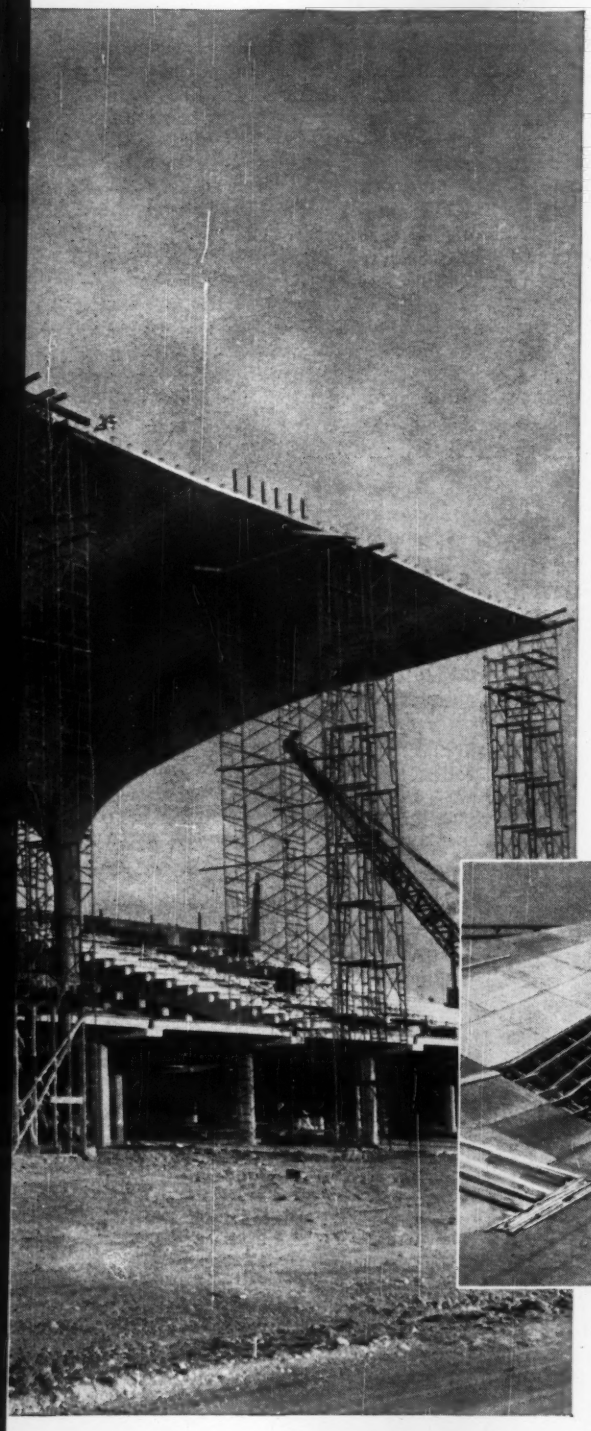
	1956	1957	1958	1959	1960	Change '59–'60 %
Total New Capital	$14,213	$16,653	$18,190	$17,237	$17,066	− 1
Corporate Security Sales	4,727	5,683	5,041	4,165	3,698	−11
State & Municipal	4,781	5,803	6,370	6,002	6,636	+11
Buildings	2,000	2,791	2,759	2,509	3,156	+25
Schools	1,609	2,150	1,940	1,694	2,188	+29
Housing	91	185	116	120	242	+102
Other Buildings	300	456	703	695	726	+ 4
Heavy Construction	2,781	3,012	3,611	3,493	3,480	−0.4
Waterworks	396	520	477	540	442	−18
Sewerage	426	418	478	424	357	−16
Bridges	51	70	64	162	178	+10
Highways	609	860	986	553	611	+10
Earthwork, dams, waterways	19	23	424	793	455	−43
Unclassified	1,283	1,121	1,182	1,021	1,437	+41
Electric and gas utilities	.....	239	225	145	276	+90
Airports	.....	135	106	194	90	−54
Parking facilities	.....	34	25	32	26	−19
Other, incl gnrl imprvm	.....	713	825	650	1,045	+61
Federal Aid*	1,070	2,161	2,596	3,343	3,228	− 4
Federal Loans	159	200	199	140	178	+27
Total Non-Federal	10,737	13,847	14,208	13,650	13,741	+ 1
Federal Appropriations:						
Federal projects in US	3,460	2,777	3,946	3,564	3,166	−11
Federal projects outside US	16	29	35	22	159	+623

* For highways, airports, hospitals. To rural electric and telephone co-ops.

Fir plywood helps solve problem on giant

SCIOTO DOWNS RACE TRACK
LOCATION: Columbus, Ohio
ARCHITECTS: Kellam & Foley, Columbus
STRUCTURAL ENGINEERS:
Gensert, Williams & Associates, Cleveland
CONTRACTOR: Sheaf Construction Co., Columbus

complex forming concrete umbrella roofs



PLYWOOD'S UNIQUE ADAPTABILITY as concrete form material simplified a complicated roof construction job at the Scioto Downs race track, Columbus, Ohio. At the same time, plywood created smooth concrete surfaces and kept costs low.

The striking grandstand roof is a series of huge hyperbolic-paraboloid concrete shells. Each 61 x 116-ft. section is supported by a 44-ft. column. The clubhouse and offices have thin-shell concrete folded plate roofs.

Plywood was shaped so easily to the complex curvatures of the grandstand roof, and made such tight joints, that the contractors found it needed no liner. Original specifications had been for lumber or plywood backing faced with hardboard for surface smoothness. But a single layer of ¾" plywood to do both jobs resulted in a smooth, fin-free concrete surface, besides eliminating the labor and material cost of applying liner.

More savings came from plywood's ease of handling, which the contractors called a real cost cutter. And rate of re-use was exceptionally high. Panels stripped from the grandstand roof were used on the folded plates and were still good for many more times. There was only a four percent loss out of 10,000 sq. ft. of plywood.

DOUGLAS FIR PLYWOOD ASSOCIATION
TACOMA 2, WASHINGTON

—a non-profit industry organization devoted to research, promotion and quality control

DFPA TESTED QUALITY

ALWAYS SPECIFY DFPA-QUALITY TRADEMARKED PLYWOOD.
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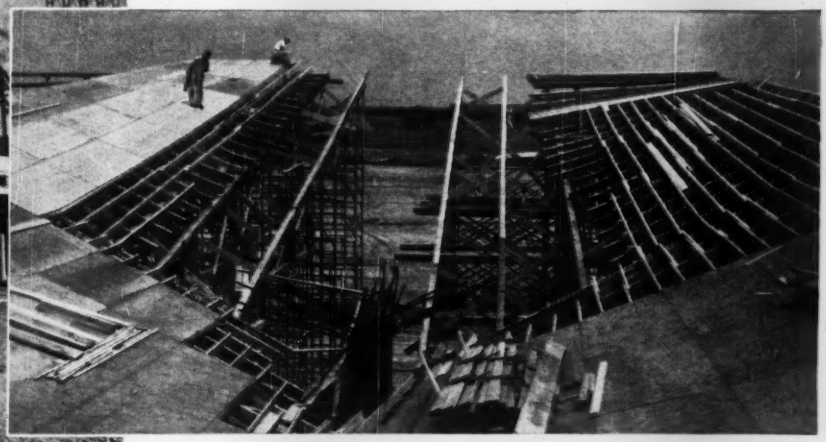


Grandstand roof forms were of ¾" fir plywood over a grid of 2x4's and 2x6's. Panels adapted readily to required curves, yet joints were tight and final concrete surface was smooth and even. Office building behind grandstand and clubhouse at side have continuous folded plate concrete roofs. They were formed against plywood panels previously used on grandstand roof.

A New Approach to Bargaining

- **Kaiser group seeks labor contract changes that may lead to strike-free negotiations.**
- **Labor-management proposal utilizes help of public in finding labor problem solutions.**

Labor and management at Kaiser Steel Corp. are writing a new chapter in collective bargaining.

The two groups have recommended adoption of a plan that entails continuing public participation in labor-management relations and in contract negotiations as a means of preventing strikes. The recommendation is contained in a proposed amendment to their current labor contract. Its sponsors claim that the amendment, if adopted, will be the first of its kind in the nation.

The plan was proposed with two things in mind:

- It will promote the voluntary settlement of labor-management problems as they arise, thus avoiding the accumulation of unsettled problems for crash-type solutions under the deadline pressures of bargaining.
- It will give the parties, during contract negotiations, the benefit of the voluntarily solicited advice and assistance of jointly selected members of the public.

By minimizing the chances of strikes, the plan is aimed at the preservation of free collective bargaining and the foreclosure of federal intervention in labor disputes.

The approach has been implicitly endorsed by a study committee that has just completed a report on collective bargaining in steel for the U. S. Labor Department. Harvard Professor E. Robert Livernash, who headed the group, has taken a dim view of federal intervention and has suggested voluntary use of impartial members of the public as more effective mediators.

The Kaiser proposal grew out of the long-range committee set up in the 1959 Kaiser labor contract. The committee's job is to seek a plan for the "equitable sharing between the stockholders, the employees and the public, of the fruits of the company's progress." The committee represents the company, the steelworkers union and the public (ENR Nov. 5, 1959, p. 105). One of its three public members is John Dunlop, who is chairman of the Construction Industry Joint Conference.

The new proposal, which would expand and refine the committee's activities, calls for three broad changes in the current labor contract:

- The activities of the committee will be expanded, making the committee a continuously functioning one for the purpose of considering subjects that may promote "permanent harmonious relations" between the parties.
- Bargaining must start not later than 60 days prior to the expiration of the current contract. Every effort must be made to reach agreement before the contract expires.
- If necessary, the committee will be convened not later than 30 days prior to the contract's termination to review the status of negotiations. Public members of the committee will be authorized to take any one or all of several steps at that time: Do nothing; attend the bargaining sessions as observers; engage in mediation efforts; issue a private report defining the issues and recommending solutions; issue a public report on the bargaining situation.

Neither the company nor the union agrees to be bound by the recommendations of the public members.

The proposal is expected to be approved by Kaiser's board of directors and by the union's executive committee.

Kaiser and union spokesmen said they hoped the continuing availability of outside assistance on a mutually agreeable and voluntary basis would "strengthen the collective bargaining process" and "substantially increase the opportunities for peaceful settlement" of labor management differences.

The proposal does not cancel the original goals of the long-range committee. Kaiser Steel Chairman Edgar F. Kaiser said: "No one should conclude this is ducking a solution to sharing profits equitably. We're still working on it. We're making progress."

George Taylor, who heads the committee, indicated that the solution to that problem is not yet in sight. He said the committee has been working "earnestly and diligently" and "is learning a great deal about the economic problems involved."

"None of us," he added, "has any idea when we can discover a formula that would be helpful, and, of course, in such an undertaking no timetable can be set."

Commenting generally on the committee's progress, Mr. Kaiser made this observation: "By sitting down together three or four times a year, each of us has more understanding of what subjects will help us keep the peace. In the past, we didn't see each other for a couple of years. This committee is bringing us closer together; it's more than just a committee—we're meeting regularly. We are all enthused."

Peaceful Year for Labor

Last year was one of the most peaceful years in labor-management relations since World War II.

That is the preliminary conclusion of the U. S. Labor Department's Bureau of Labor Statistics. The bureau, in a year-end report, says that approximately 3,300 work stoppages began in 1960, the lowest level since 1942.

Sixteen major strikes—those involving 10,000 or more workers—occurred in the construction, railroad, shipbuilding, aircraft and electrical manufacturing industries, according to the bureau. The four major strikes in the construction industry accounted for 28% of the total number of workers involved in 1960 stoppages and 31% of the total 1960 strike idleness.

The major construction strikes occurred in New York City, St. Louis, Minneapolis and St. Paul, Minn., and Buffalo, N. Y.

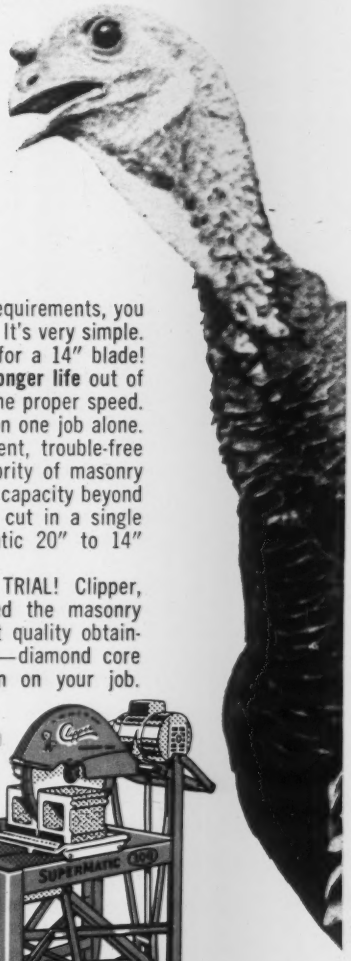
Total idleness caused by all the 1960 strikes, both large and small, was 20 million man-days, or 0.2% of the estimated working time of all nonfarm workers, the bureau said. The strike involved 1,400,000 workers.

The lowest post-war strike idleness occurred in 1957, when it was 0.1%. Although there were fewer strikes in 1960, the number of man-days lost was 20% greater than in 1957 because some of the strikes lasted longer.

Included in the bureau's figures are all known strikes that involved six or more workers.

LET'S TALK TURKEY

and clear up some facts about MASONRY SAWS



Don't be misled! If a 14" masonry saw meets your requirements, you penalize yourself severely by buying a 20" universal saw. It's very simple. The right speed for a 20" blade is **not** the right speed for a 14" blade!

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Clipper SuperMatic 14" Hi-Speed is the most efficient, trouble-free masonry saw ever built. It's **the** saw for the great majority of masonry saw users. But, Clipper realizes that certain jobs call for capacity beyond 14"; for instance, a large block job where you want to cut in a single pass. That's why Clipper also offers you the SuperMatic 20" to 14" universal saw.

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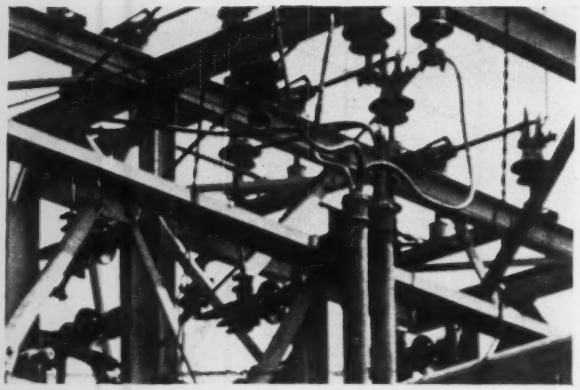
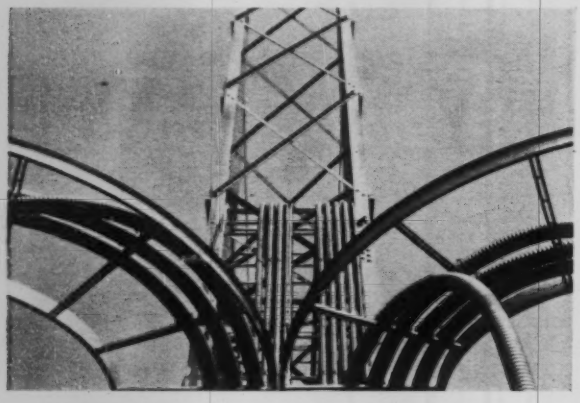
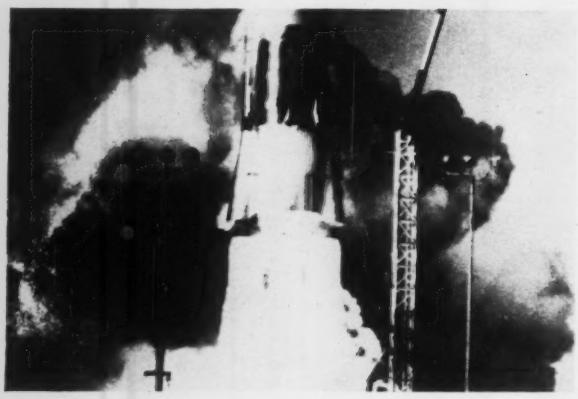
"Old Dog – New Tricks"...



"Nervous System for a Giant"...



"Bridge on the River KVA"...



"We've Coined a Word for It"...

REMEMBER THESE ADS?

These pictures, gleaned from recent advertisements in Engineering News-Record, show just a few of Lord Electric Company's activities. Whether it's installing the electric trolley for a jet hangar door or helping to loft an ICBM, Lord brings every project cost-saving ingenuity to match its 65 years of experience.

We've just published a handsome, new, 48-page book telling something of that experience, dating back to 1895, when electrical energy was a new utility. It depicts a variety of the important recent electrical installations that have taken us into 39 states, Puerto Rico, and the British West Indies. We will be pleased to send you a copy. Just jot a note on your letter head and we will put your book in the mail for you at once.

LORD

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Electrical Contractors to the Nation Since 1895

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NEW YORK 10 Rockefeller Plaza, New York
RICHLAND, WASH. 1305 Mansfield Street
PITTSBURGH 2 Gateway Center
PORTLAND, ORE. 1034 S. E. Water Avenue

Owner Had Right to Veto Sub

An owner may reserve the right to approve or disapprove the contractor's selection of subcontractors. In such cases, the negotiation of subcontracts should be so conducted as to avoid liability for breach of contract.

The price of carelessness can be high, as the following case illustrates.

The Hedin Construction Company entered into a general contract for the construction of a new school building and then executed a written agreement with Bowen Electric Company to perform the electrical work called for by the contract. Some six weeks later, Hedin entered into an agreement with A. G. Crunkleton Electric Company to perform the same work. Bowen then brought an action to recover damages for breach of the contract and was awarded $30,000 in damages.

Hedin appealed from the judgment rendered by the trial court, contending that the local Board of Education had not approved of Bowen as a subcontractor, and that such approval was a prerequisite to constituting a contract. The invitation to bidders provided that the Board of Education had the right to accept or reject any subcontractor used to perform part of the work in erecting the building.

The Board of Education at no time rejected Bowen as a subcontractor but had suggested to Hedin that it subcontract the electrical work to Crunkleton. The evidence indicated that the Board of Education had had no knowledge that Hedin had entered into a contract with Bowen to perform the electrical work at the time it suggested to Hedin that it employ Crunkleton to perform the electrical work.

The appellate court[1] held that: "Clearly Hedin cannot argue that the Board's unexercised right of rejection relieves Hedin from liability on the contract which it had theretofore executed with Bowen. Hedin is bound."

The appellate court found that the amount of damages awarded was excessive and not warranted by the evidence and directed a new trial to reassess the award of damages.

It might be noted that there are cases to the effect that where an agreement to subcontract part of the work is entered into, the fact that the party for whom the work is to be done objects to the use of the subcontractor, does not relieve the general contractor from liability for damages for breach of contract.

(1) J. D. Hedin Construction Co. v. F. S. Bowen Electric Co., 273 F. 2d 511, U.S. Court of Appeals, January 11, 1960.

Suit Barred by Arbitration

A broad arbitration clause in a construction contract may prevent litigation of disputes.

Such a result occurred in the following New York case.

A subcontractor brought an action against the prime contractor to foreclose two mechanics' liens for work allegedly performed under the subcontract. The prime contractor applied to the court for an order staying the subcontractor from taking further legal steps in the action pending arbitration of the disputes as provided for in the contract and demanded by the prime contractor. This application was denied by the Supreme Court and the denial was affirmed by the Appellate Division.[1]

The Appellate Division gave the contractor the right to appeal to the Court of Appeals. That court reversed the determination of the lower courts.

The subcontract provided for the submission to arbitration of "all questions that may arise under this contract and in the performance of the work thereunder."

The Court of Appeals[2] held that under the provision of the contract disagreements which arose between the parties concerning their rights and obligations under the contract, and in the performance thereof, were arbitrable, in accordance with such agreement, except as to the subcontractor's claim for consequential damages resulting from the contractor's alleged interference with and delays of the subcontractor. It ruled that the contractor was entitled to stay the subcontractor's action with such exception, even though the complaint alleged breach and repudiation of the subcontract by the prime contractor.

(1) De Lillo Construction Co., Inc., v. Lizza & Sons, Inc., 7 A.D. 2d 838, 182 N.Y.S. 2d 297.

(2) De Lillo Construction Co., Inc. v. Lizza & Sons, Inc., 164 N.E. 2d 95, New York Court of Appeals, December 30, 1959.

Contract May Stipulate Liquidated Damages

A contract provision providing a stipulated sum as liquidated damages for breach of the contract will generally be enforced.

In a Pennsylvania case, for example, a party named Laughlin signed a contract to purchase a lot from Baltalden. The latter agreed to erect a house that would be substantially similar to a sample house in a development.

The contract called for a down payment of $1,900. In the event the purchaser refused to consummate the contract, the seller could retain the down payment as liquidated damages.

At the time of taking title, the buyer refused to purchase, claiming that the house as erected was not substantially similar to the sample house. The sample house was so graded that only one step was necessary from the kitchen to the ground at the rear. The stone used in the construction was all of one type or color. The home actually constructed had six wooden steps leading from the kitchen to the ground, and the stone used consisted of two different types.

The buyer brought an action to recover the down payment but was denied a recovery and the judgment was affirmed on appeal.[1] The issue of whether the house as constructed was substantially similar to the sample house was submitted to the jury who found in favor of the seller.

The evidence disclosed that at the time the agreement was entered into, the lot upon which the house was to be built had a much greater drop in elevation to the rear than the sample house. At the time the lot was selected, a part of the work on the house had been started and part of the stone work had already been installed. Also at the time the agreement was entered into, the lot had already been graded but because of the difference in elevation between the sample house lot and the lot of the house in question, additional steps were required leading from the kitchen to the ground.

The buyer contended that the forfeiture of the down payment constituted a penalty rather than liquidated damages. The court held that where a purchaser repudiates a real estate purchase agreement containing a provision for liquidated damages, the seller is entitled to the sum agreed upon as liquidated damages.

(1) Laughlin v. Baltalden, Inc., 159 A. 2d 26, Superior Court of Pennsylvania, March 24, 1960.

OFFICIAL PROPOSALS

Bids: February 27, 1961

Proposed Improvements to the Sanitary Sewerage System of Lewes, Delaware

NOTICE TO BIDDERS

Sealed bids for the construction of proposed improvements to the sanitary sewerage system of Lewes, Delaware, consisting of intercepting sewers, sewage pumping stations, force mains, sewage treatment plant, and outfall sewer under Schedule A, sub-main and lateral sewers, including house connections under Schedule B, all under Project No. WPC-Del-4, will be received by the Board of Public Works of Lewes in their office located at 129 Second Street, Lewes, Delaware, until 7:00 P.M. (E.S.T.) Monday, February 27, 1961, at which place and time the bids will be publicly opened and read aloud.

Alternate bids are required under Schedule A in connection with (1) reduction in scope of grading and fencing at the sewage treatment plant site, (2) elimination of the digester floating cover, together with its position indicator, and (3) elimination of glass cover and lighting over two sludge beds.

The bidder may bid on either Schedule A (including Alternates) or Schedule B or both Schedules. A summary of major items and the approximate quantities applicable to unit items are as follows:

SCHEDULE A (BASE BID)

5260 L.F. 8", 10", and 16" Clay Pipe and Cast Iron Sewers; 13,710 L.F. 6", 8", and 12" Cast Iron Force Mains; 190 L.F. 12" Cast Iron Force Main under the Lewes and Rehoboth Canal; 650 L.F. 6" Cast Iron Water Mains; 2.50 Tons Cast Iron Fittings; 24 Standard Manholes (240 Vert. Ft.); 8 Dual-Chamber Diversion Manholes; 90 MBM Timber Sheeting Left in Place; 70 Cu. Yds. Crushed Mineral Aggregate for Excavation and Refill Below Sub-grade; 600 Cu. Yds. Excavation Below Sub-grade for Sand Jackets; 2100 Tons Beach Sand for Encasements Around Cast Iron Pipe in Marsh Land; 8800 Cu. Yds. Select Materials for Trench Refill, Etc.; 460 Tons Crushed Mineral Aggregate for Temporary Repaving; 3100 Sq. Yds. Miscellaneous Types of Permanent Pavings; 2 Standard-Type Sewage Pumping Stations, including Emergency Overflow Lines and Stated Allowances for Landscaping; 6 Ejector-Type Underground Sewage Pumping Stations; Sewage Treatment Plant (Primary Type) Complete, including Control Building, Grit Chamber, Clariflocculator, Digester, Sludge Drying Beds, Equipment, Miscellaneous Piping and Appurtenances (Conveying Water, Sewage, and Drainage on Site); Site and Off-Site Improvements including a Stated Allowance for Landscaping; 6800 L.F. Untreated Timber Piling (340 Piles); 1380 L.F. Creosoted Timber Piling (69 Piles); 1300 L.F. 16" Cast Iron Outfall Sewer, 230 Tons of Mineral Aggregate Subfill for Outfall Sewer and 140 Cu. Yds. of Concrete or Stone Rubble for Headwall of Outfall Sewer.

SCHEDULE B

6700 L.F. 6" Clay Pipe House Connections; 33,535 L.F. 8" Clay Pipe Sewers; 181 Type A and Type B Manholes (1125 Vert. Ft.); 25 MBM Timber Sheeting Left in Place; 5 MBM creosoted Lumber in Foundation; 200 Cu. Yds. Crushed Mineral Aggregate for Refill Below Subgrade; 10 Cu. Yds. Class C Concrete for Cradles, Etc.; 12,600 Cu. Yds. Select Materials (Borrow); 870 Tons Crushed Mineral Aggregate for Temporary Repaving; 8000 Sq. Yds. Miscellaneous Types of Permanent Repaving of Roadway Sections Over Trenches.

This project will be financed with funds furnished by the Board of Public Works of Lewes together with Federal grants obtained under the provisions of Public Law 660.

The attention of bidders is directed to the Special Conditions covering this work, which include the Anti-Kickback Regulations issued by the Secretary of Labor (29 CFR Part 3) and other special requirements.

Plans, specifications, and other contract documents may be examined at the office of Bayard V. Coulter, General Manager of the Board of Public Works of Lewes located at 129 Second Street in Lewes, Delaware, or may be obtained from the office of Clarke Gardner and Percy Sterling, Consulting Engineers, Calvert and Bond Streets, Salisbury, Maryland, upon deposit of $50.00 for the initial set and $40.00 for each additional set. If the documents are returned in good order within 30 days after the opening of bids, the full amount of the original deposit for one set will be returned to each actual bidder. A refund of $10.00 will be made to non-bidders and subcontractors, or for each additional set of documents obtained by actual bidders.

Each bid must be accompanied by a properly prepared bid bond satisfactory to the Board of Public Works of Lewes in an amount not less than 5% of the total bid of Schedule A (Base) and/or Schedule B.

Approved Performance and Payment Bonds, each in the amount of 100% of the contract, or contracts, as awarded, will be required from the successful bidder or bidders.

No bidder may withdrawn his bid within 45 days after the actual date of the bid opening.

The Board of Public Works reserves the right to award a separate contract to the lowest qualified bidder for each Schedule —utilizing any or all of the alternatives under Schedule A as may be in its interest. The right is further reserved to consider informal any bid not prepared and submitted in accordance with the provisions of the contract documents, and to waive any informalities in or reject any or all bids.

BOARD OF PUBLIC WORKS OF LEWES
William T. Manning, President
Bayard V. Coulter, General Manager
January 19, 1961

Bids: February 16, 1961.

New Jersey Turnpike Authority

Advertisement for Proposals Contract Nos. R-78A, R-78B, R-78C, R-78D and R-78E

Proposals are invited for Contract Nos. R-78A, R-78B, R-78C, R-78D and R-78E which involves the construction of a Utility Building complete, adjacent to the proposed new toll plaza, and other incidental work, in connection with improvements of the Carteret Interchange of the New Jersey Turnpike, in Middlesex County, New Jersey, as follows:

Contract No. R-78A—General Construction
Contract No. R-78B—Structural Steel & Miscellaneous Metal
Contract No. R-78C—Heating and Ventilating
Contract No. R-78D—Plumbing
Contract No. R-78E—Electrical

Proposals will be received at the New Jersey Turnpike Authority Administration Building, New Brunswick, New Jersey, until 11:00 o'clock, Eastern Standard Time, on the morning of February 16, 1961, at which time and place said proposals will be publicly opened and read.

Contract documents may be examined during office hours on or after January 20, 1961, at the office of the Authority, and will be furnished upon payment of Ten Dollars ($10.00) for each set, not refundable.

NEW JERSEY TURNPIKE AUTHORITY
Joseph Morecraft, Jr., Chairman
January 13, 1961

Read the Official Proposal Columns of ENGINEERING NEWS-RECORD This Week and Every Week

OFFICIAL PROPOSALS

District of Columbia—Building Construction—Dept. of Sanitary Eng., D. C., Jan. 17, 1961. POTOMAC RIVER INTERCEPTOR SYSTEM PART 3—POTOMAC SEWAGE PUMPING STATION (Invitation No. C-6158-S), consisting of furnishing all labor, materials and equipment necessary and performing all work required for the construction of the Pumping Station, furnishing and installing equipment and all other appurtenant work. (Wage Rates have been predetermined by Labor Dept.) Bid forms, plans and specifications are now available from Supervisor, Bid & Contract Division, Procurement Office, D. C., Rm. 404, 499 Pa. Ave., N.W., upon deposit of a certified check for $50.00 per set, payable to D.C. Treasurer. (Phone NA 8-6000, Ext. 2378). SEALED BIDS to be opened 3:00 PM, EST, Feb. 14, 1961, in Room 424, 499 Pa. Ave., N.W.

District of Columbia—Highway Construction—Dept. of Hwys. & Traffic, D. C., Jan. 5, 1961. SOUTHWEST FREEWAY—11TH ST., S.W., CONNECTION TO 12TH ST. EXPRESSWAY, FEDERAL AID PROJECT NO. S-SG-72(1) — Invitation C-6168-H, consisting of 5,200 sq. yds. reinforced Portland cement concrete base 10" dept; 11,100 sq. yds. sheet asphalt pavement 2½" depth; 1,890 cu. yds. Class BB wall concrete; 12,000 cu. ft. Class B stone masonry; 17 each prestressed concrete beams, type A, and 54 each prestressed concrete beams, type B. (Wage rates have been predetermined by the Labor Dept.) Bid forms, plans and specifications are now available from Supervisor, Bid & Contract Div., Procurement Office, D. C., Rm. 404, 499 Pa. Ave., N.W., upon deposit of a certified check for $30.00 per set, payable to D. C. Treasurer (Phone NA 8-6000, Ext. 2378). SEALED BIDS to be opened 3:00 PM, EST, Febr. 2, 1961, in RM. 424, 499 Pa. Ave., N. W.

U. S. Government

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. DC-5483) will be received at Klamath Falls, Oregon, until 10 a.m. Pacific Standard Time, February 23, 1961, for furnishing labor and materials for Earthwork and Structures for Laterals and Drains, Sump 2, Contract Unit 3, Klamath Project, Oregon-California. Location near Tule Lake, California. Principal items are 392,000 cu. yds. of excavation for construction of laterals and for drains; 2,000 lin. ft. of 24 to 60-inch corrugated metal pipe; placing and compacting 50,000 cu. yds. of earth lining for laterals; and other work. Completion time 300 days. For particulars, address Bureau of Reclamation, P. O. Box 312, Klamath Falls, Oregon; P. O. Box 2511, Sacramento, California; or Building 53, Denver Federal Center, Denver 25, Colorado. Floyd E. Dominy, Commissioner.

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. DC-5486) will be received at Hardin, Montana, until 10 a.m., Mountain Standard Time, March 2, 1961, for furnishing labor and materials for Residences for Government Community at Yellowtail Dam, Yellowtail Unit, Montana-Wyoming, Missouri River Basin Project. Location near Hardin, Montana. Principal items are Lump Sum—Constructing fifteen residences complete; and other work. Completion time 240 days. For particulars, address Bureau of Reclamation, P. O. Box 2553, Billings, Montana; P. O. Box E, Hardin, Montana; or Building 53, Denver Federal Center, Denver 25, Colorado. Floyd E. Dominy, Commissioner.

OFFICIAL PROPOSAL

RATE $2.70 per line (or fraction) per insertion.

CLOSING DATE: 10:30 a.m. Friday for issue out following Thursday.

SEND COPY: Official Proposal Division, Class. Adv. Div.; Engineering News-Record, P. O. Box 12, New York 36, N. Y.

OFFICIAL PROPOSALS

Bids: February 7, 1961

St. Lawrence Power Project

POWER AUTHORITY OF THE STATE OF NEW YORK
ADVERTISEMENTS FOR PROPOSALS FOR
PLANTING AND REPLANTING OF SPECIMEN TREES, SHRUBS, AND GROUND COVER PLANTS DURING 1961 IN CONSTRUCTION AREAS AND STATE PARK NEAR MASSENA
ST. LAWRENCE COUNTY, NEW YORK
ST. LAWRENCE CONTRACT NO. 61
SPECIFICATION NO. PA-5-11059

NOTICE TO CONTRACTORS: The Power Authority of the State of New York will receive sealed proposals for Planting and Replanting of Specimen Trees, Shurbs and Ground Cover Plants during 1961 in Construction Areas and State Park, near Massena, St. Lawrence County, New York, until 10:30 A.M. Eastern Standard Time on the 7th day of February, 1961, at the Authority's Office, 18th Floor, the Coliseum Tower, 10 Columbus Circle, New York 19, New York, at which time and place the proposals will be publicly opened and read aloud.

The principal items of work are:
Estimated:

96 trees	Planting "Authority-furnished" specimen deciduous trees
1,530 trees	Furnishing and planting specimen deciduous trees
784 trees	Furnishing and planting specimen evergreen trees
4,400 shrubs	Planting "Authority-furnished" deciduous shrubs
3,951 shrubs	Furnishing and planting deciduous shrubs
10,000 plants	Planting "Authority-furnished" ground cover plants
2,000 plants	Furnishing and planting ground cover plants
6 acres	Grading, topsoiling and seeding

All scheduled planting shall be completed on or before June 30, 1961. All work shall be completed on or before June 30, 1962.

Plans, Specifications and Proposal Forms for the work may be obtained from the Power Authority of the State of New York, at the 18th Floor, the Coliseum Tower, 10 Columbus Circle, New York 19, New York, upon application and prepayment of a fee of Ten Dollars ($10.00) per initial set of contract documents, and Five Dollars ($5.00) per set for additional sets, no part of which will be refunded. Plans, Specifications and Proposal Forms for the work will be on file in the Authority's Office and in the offices of the Engineer, Uhl, Hall & Rich, 230 Congress Street, Boston 10, Massachusetts, and may be inspected by prospective bidders during office hours.

Bids must be made and returned in duplicate in accordance with instructions contained in the Information for Bidders. Guarantee will be required with each bid in an amount not less than 20 percent of the gross sum bid.

The right is reserved to reject any or all bids.

W. S. CHAPIN
GENERAL MANAGER

U. S. Government

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. DC-5480) will be received at Collbran, Colorado, until 10 a.m., Mountain Standard Time, March 2, 1961, for furnishing labor and materials for Completion of Upper and Lower Molina Powerplants and Switchyards, Collbran Project, Colorado. Location near Collbran, Colorado. Principal items are 420 cu. yds. concrete; Lump sum —furnishing and installing heating and ventilating systems; Lump sum installing and testing one 12,000 and one 6,800 horsepower hydraulic turbine; 40,000 pounds—furnishing and erecting steel structures; Lump sum —Installing two generators and main exciter and appurtenant equipment; and other work. Completion time 305 days. For particulars, address Bureau of Reclamation, P. O. Box 360, Salt Lake City 10, Utah; P. O. Box 396, Collbran, Colorado; or Building 53, Denver Federal Center, Denver 25, Colorado. Floyd E. Dominy, Commissioner.

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The advertising rate is $45.20 per in. for all adv. appearing on other than a contract basis. Frequency rates quoted on request.
An advertising inch is measured 7/8" vertically on a column—3 columns—30 inches to a page.

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$2.70 per line, min. 3 lines. To figure advance payment count 5 aver. words as a line.
Position Wanted ads take 1/2 of above rate.
Box numbers—count as 1 line.
Discount 10% if full payment is made in advance for 4 consecutive insertions.

ADDRESS BOX NO. REPLIES TO: Box No. Classified Adv. Div. of this publication. Send to office nearest you.
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CHICAGO 11: 520 N. Michigan Ave.
SAN FRANCISCO 11: 255 California St.

• *POSITIONS VACANT*

Sales Engineers—We need men with sales ability & experience in concrete & construction for sales engineering position open in Chicago, Virginia, Texas and Metropolitan New York. Must have potential as future district sales manager. Positions are independent, interesting, challenging & long term. Sika Chemical Corp., Passaic, N. J.

General Superintendent—Must be completely experienced in all phases of grading, paving, site work and road construction. Salary open, yearly employment, two weeks vacation. All replies confidential. Send complete resume to The Thomas Colla Company, 251 Broad St., Manchester, Conn.

Guard Rail Superintendent—Must be qualified to handle field reports, payroll forms and exercise independent judgment pertaining to problems of guard rail installation. Salary open. P-5955, Engineering News-Record.

Supt. and Foreman—Storm drain and flood control—Experienced large diam. pipe, excavation and conc. box. Proven organizer and producer—So. Calif. P-5957, Engineering News-Record.

Civil Engineer—Estimator—Must be completely experienced in site work take-offs. Salary open, yearly employment, two weeks vacation. All replies confidential. Send complete resume to The Thomas Colla Company, 251 Broad St., Manchester, Conn.

Equipment Superintendent for established highway and heavy construction contractor. Must have thorough knowledge and be capable to supervise the maintenance and repair of large heavy equipment spread. Excellent opportunity for right man. The W. L. Harper Company, P.O. Box #170, Cincinnati (12), Ohio.

Wanted—General Superintendent for well-established Paving and Grading Firm. Must have thorough knowledge of all phases of Dirt and Concrete Paving. Only a top man will be considered. P-5937, Engineering News-Record.

Civil Engineer with 20 to 26 years experience in design and construction of highway, bridge, airport, waterfront, and industrial projects to manage consulting office in New York City. P-5932, Engineering News-Record.

Bridge Designer, graduate engineer, minimum 3 yrs. experience, Connecticut expressway project. Beginning salary $550-$650 per month depending upon qualifications. Structural draftsmen, beginning salary $450-$600 per month depending upon ability. Send complete resume, P-5953, Engineering News-Record.

Sales Engineer—Sales positions open with large form manufacturer selling to contractors. Some knowledge of construction essential. If you are interested in a real opportunity for high earnings with a company that has made steady progress in the industry, write giving qualifications and resume of experience to P-5854, Engineering News-Record.

Project Manager—for medium size building contractor located in central Connecticut. Graduate engineer preferred. Experience required in subcontracting, coordination with architects, engineers, and owners, scheduling and expediting. Senior position with excellent opportunity for advancement. Send full details and salary requirements. P-5851, Engineering News-Record.

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Estimator—General Superintendent—Experienced sewerage and waterworks construction. Engineering background desirable. Medium size contractor specializing all phases this type construction. Midwest location. Send complete resume. P-5970, Engineering News-Record.

General Superintendent. Midwestern utility contractor, city distribution, cross country pipelines of all types, industrial piping and fabrication. Must have good following of top construction men, customer contacts and customer relations. Some estimating experience required and engineering experience would be an asset. Send complete resume. P-5875, Engineering News-Record.

Wanted Civil Engineer with 5-10 years Heavy Dam Construction experience for established Construction Company. Prefer a man 40 years of age or over to work in home office as Project Manager on Dam Construction and other heavy construction work. Martin K. Eby Construction Co., Inc., P.O. Box 1679, Wichita, Kansas.

Structural Testing & Stress Analysis. Electrical strain gage experience. Model experience helpful. Give complete resume and salary requirements. Chicago. P-5878, Engineering News-Record.

Construction Accountant for established, middle-sized general contractor. Accounts payable, payroll, and costs, full set of books to taxes. Good salary, living and working conditions in small central Maryland city. Must have experience, capacity for hard work, and good record. Write P-5892, Engineering News-Record.

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(Continued on the following page)

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P-5993, Engineering News-Record
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(Continued on opposite page)

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(Continued from opposite page)

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Construction Manager. Heavy construction experience as Job Engineer and Supt. from bid to completion, both field and office. Desires position as Project Mgr or Supt in Central New Jersey or vicinity, with progressive firm. Age 39. PW-5882, Engineering News-Record.

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Project Manager — Construction Superintendent—wide experience estimating to completion, highways, airports and heavy construction projects. 15 years last contractor. Resume on request. PW-5979, Engineering News-Record.

Civil engineer, 37, married, 16 years experience from Europe, Middle East, Canada, in heavy construction and design of highways, sewers, bridges etc., presently chief engineer in heavy construction, several languages, desire job U.S. or O.S. PW-5974, Engineering News-Record.

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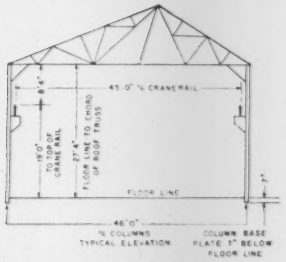
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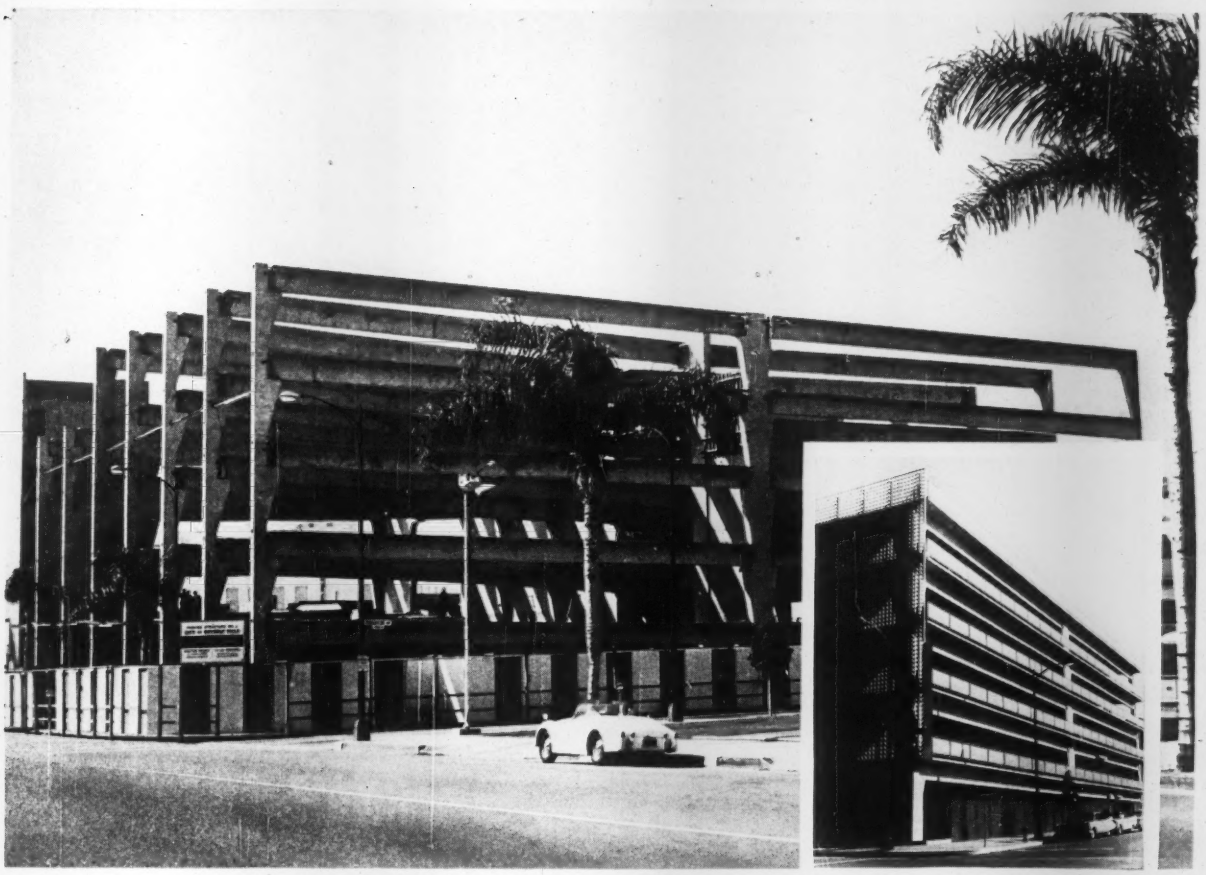

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